COMMODORE USERS

Ahoy!

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Ahoy!

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VIEW FROM THE BRIDGE

As of this writing, *Ahoy!* will no longer be available every month. It will be available every hour of every day of the month, via our new bulletin board! If you have a C-64 or VIC 20 and a modem you can call 212-564-7727 to download files providing details on upcoming issues, product information from upcoming editions of *Scuttlebutt,* and more. We'll be adding files in the future as we strive to make our bulletin board one of the most useful available to Commodore owners.

Continuing our efforts to improve your life, we've implemented a new system of printing our program listings. The changes, all of which are for the better, are outlined in the revised introduction to our program listings section on page 67. Read it before you start entering programs, or come crawling back in bewilderment—the choice is yours!

As for the rest of the November issue of *Ahoy!*: one area in which the Commodore 64 is surely second to none among microcomputers is in its music-production capabilities. That's one of the two major themes in this issue.

Cheryl Peterson is not only a talented computer writer, but strong for a little girl. She managed to wrestle popular keyboardist/producer George Bitzer away from his numerous commitments to artists like Kenny Rogers and the Bee Gees to assist her in writing *Play It Again, Sid,* an evaluation of a host of music programs for the 64. (Turn to page 18.)

Also, Peggy Herrington gives you the score on piano-style keyboards for the 64. (Turn to page 15.)

We said this issue had *two* major themes. If you were here last month, you know what else to expect: another graphics tour de force by Morton Kevelson. This month, Morton the K concludes his comparative review of *Graphics Programs on the C-64* with five more packages (turn to page 13); provides you with the means of generating an *Alternate Character Set* for the C-64 (turn to page 58); and tells you more than you thought there was to know about *Program Image File Structures.* (Turn to page 61.)

We'd hoped to present *PTE: A Personal Text Editor* in our October issue, as the natural follow-up to our two-part series on word processors. Boys being boys, Pete cut his hand open playing lacrosse and couldn't make his deadline. *PTE* appears in this issue, though; and Pete will appear on the lacrosse field again over our dead bodies! (Turn to page 42.)

For the high-tech and the high-tech at heart, David Barron and Michael Kleinert's *Block Editor for the C-64* will give you direct control over the information on your disks, allowing you to look at and modify any block you choose. (Turn to page 57.)

The *Tunnel of Tomachon* has already been dug for you—eons ago, by a race of beings that bored their way to the center of their massive planet. Your mission is to pilot your spacecraft into the tunnel and stay alive as long as you can—which may not be long at all, considering what those beings left behind them! For the unexpanded VIC. (Turn to page 49.)

In addition to the reviews of graphics programs, piano-style keyboards, and music software found in the aforementioned features, our *Reviews* section covers a number of products for the VIC and 64. (Turn to page 35.)

Orson Scott Card's *Creating Your Own Games on the VIC and 64* does not appear this issue, due to deadline difficulties. (Could Orson Scott have taken up lacrosse?) Charter columnist Dale Rupert is represented, though, dealing with the subject of two-dimensional arrays in the *Rupert Report* (turn to page 45) and setting Commodore users across the country to head-scratching in *Commodares* (turn to page 63). And we're especially excited about the debut of *S.O.S.*, wherein David Barron will answer questions posed by *Ahoy!* readers. The column will run every issue if it gets enough support. That means—write!

And—read and enjoy!—the November issue of *Ahoy!*

—David Allikas

FLOTSAM

I wish to compliment you on Richard Herring's impartial review of our product, *C*A*R*S,* in the July issue of *Ahoy!* While we agreed with most of the comments made, I wish to respond publicly on some points that were made:

• *C*A*R*S* does not prevent you from entering data that is earlier than the most recent entry, but does check to see that you do not enter duplicate data with the same odometer entry. Mr. Herring said that if you only enter month and year on refueling data that it prevents further entry for that month. I do not know what he used for an entry but the program requires month, day, and year and will not allow any other entries.

• Mr. Herring stated that taxes, depreciation, and insurance entries could not be deleted. While technically he is correct, the user can enter a negative cost which will effectively delete the data. In all fairness, this fact was inadvertently left out of our manual and will be corrected in the next printing.

• One point that Mr. Herring made about the number of entries allowed was only partially correct. *C*A*R*S* keeps track of 36 entries (months) for taxes, depreciation, and insurance, but allows for 52 entries for refueling and 20 maintenance entries. We feel that this is adequate for most users of this program.

• I'm not sure how Mr. Herring tried to delete data after it was entered, but any data can be deleted when it is being reviewed on the video output. Possibly he had the "Control Page" set to the printer, in which case data cannot be deleted.

Yes, the program does take time to keep records, but considering that the family car is the second largest investment that most people have, it is worth watching just as you would a stock issue to determine when it has outlived its usefulness to your portfolio. Most of our customers gather data and just enter it once a month, which makes sense from a time management standpoint.

In all fairness, I feel that Mr. Herring's review was thorough and complete and it is obvious that he took the time to look at the program objectively. Thank you for your diligence.

Please print our address and the price of the program ($39.50 disk, $35.50 cassette) for those readers that are interested in more information.

Thank you for your time and publishing an excellent magazine designed for novice computer users.

Mel Barnum, President
New Leaf, Inc., 120 Lynnhaven, Belleville, IL 62223 (Phone: 618-397-3660)

I just picked up an issue of your magazine. Very interesting stuff here. Your programs and articles are easy to read, but I do have one major complaint. I think that all your programs should be designed to run on both the VIC and 64.

I realize that there are differences between the machines, but modifications could be made so that your programs would run on both.

Curtis Zigler
Goldsboro, NC

*We have from time to time run a VIC translation of a 64 program (*Post Time *in June,* Terrible Twins *in August, etc.), and would love to do so for* every *64 program we publish. But we can't—not without lessening the number of original 64 programs we publish each month. With the 64 users among our readership greatly outnumbering the VIC users, a 50-50 split of program pages wouldn't be logical. Also, VIC translations of 64 programs tend to be so disappointing that we prefer to feature programs written exclusively for the VIC (like the* VIC 40-Column Operating System *last issue, and* Tunnel of Tomachon *this month) that are designed to make maximum use of that computer's capabilities.*

Could you tell me if any furniture has been designed to house a C-64, 1541 disk drive, 1702 monitor, power supply, Cardco interface, Gemini 10X printer, power outlet strip, and fan cooling system?

—L.W. Armstrong
Seattle, WA

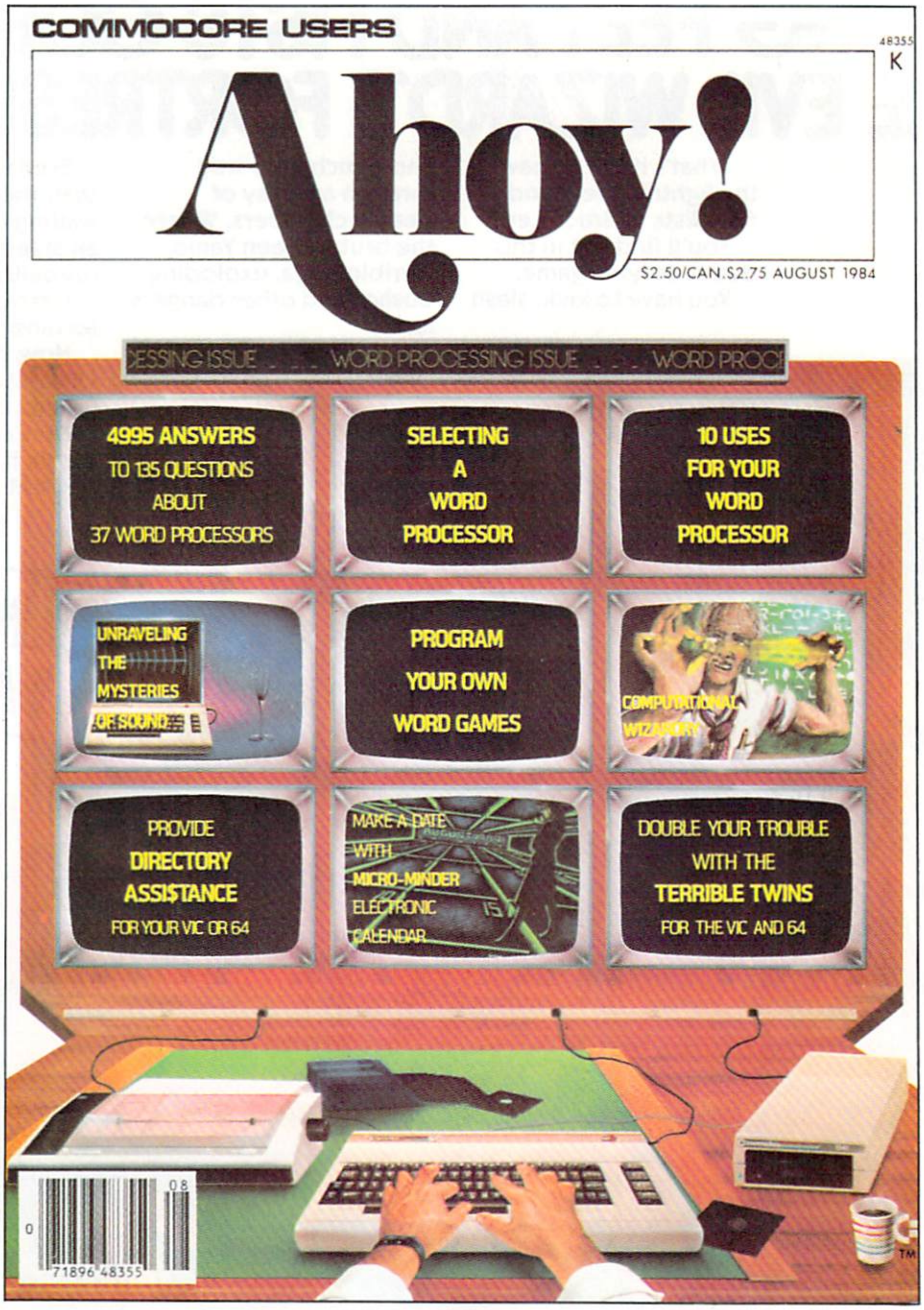
We know of no furniture designed for a configuration of hardware that specific. The industry isn't quite that *specialized yet! But you'll find several computer work stations written up in the July* Scuttlebutt.

Your July issue was the first I'd seen, and I enjoyed reading it from cover to cover. However, I think it was downright cruel of Orson Scott Card to mention *Tempest* and not tell us where we could get it. Who is distributing *Tempest* for the 64? *—William Jungers*
Stony Brook, NY

We wish we had better news for you, William, as Tempest *is a favorite of ours as well. But* Tempest *is not being produced for the C-64 as yet.*

I've come to praise and to bury you. Praise you for producing one of the better magazines available to C-64 users. Bury you because I seem to have

Continued on page 65



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MAIL NOW. . .OR AT LEAST EARLY

There's no excuse for being late with Christmas cards this year—not with a number of good mailing list programs available to label your envelopes. If you've looked ahead to your other Christmas expenses, you may elect to go with Bob Lloret's *Ultra-Mail*, appearing in the January *Ahoy!* If you're a little better off, and if you use Cardco's *Write Now* word processor, there's *Mail Now*, a database-type mailing list that allows you to merge sorted information with *Write Now* text to create form letters easily.

Features include sort by zip, category, last name, and state, 10-character comment line and 2-character category field (both optionally printable), and complete field search with use of wild cards within the search parameter allowed. Suggested list price for the C-64 disk is $39.95.

Cardco, Inc., 300 South Topeka, Wichita, KS 67202 (phone: 316-267-6525).



Cardco's totally menu-driven* Mail Now *can support 600 entries per disk.
READER SERVICE NO. 289

PLEASE, SIR—WE WANT SOME GRAPHICS PROGRAMS

As we laid out the pages for the graphics reviews in this issue and last, we pictured you VIC owners eyeing the samples of 64-generated art like children with their noses pressed against the bakery window. But there's no need to go to bed hungry—not with products like *PLOTVIC*, a hi-res graphics kit from Apcad for the unexpanded VIC, VIC +3K *(PLOTVIC3)*, or VIC +8K *(PLOTVIC8)*.

Creative packing and overlaying techniques allow the program to offer features like full screen window, geometric figure and text generation and positioning, eight-element color selection, 3D perspective generation, and hi-res printing capacity. Versions for the +3K and +8K VIC allow for light pen input. The program is easily modified for use with personal programming. All versions $19.95 cassette (transferrable to disk).

Apcad, POB 83, Saline, MI 48176.

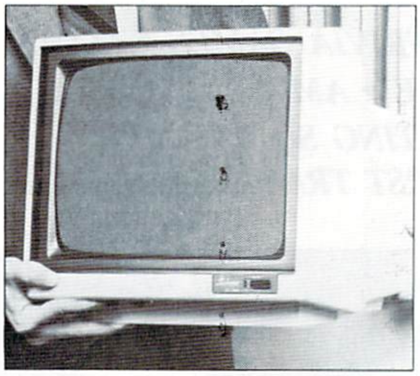
WRITE YOUR OWN TICKET

Action Writer is the latest addition to the CodeWriter family of "programs that write programs" showcased in our June issue. This latest release permits the user to combine action, movement, color, and sound selections into his own arcade-style games, without programming knowledge. (CodeWriter Corporation, by the way, encourages individuals who use their software to sell their creations for profit. That's an attitude we applaud, as interesting as the copyright duels that would have ensued might have been.)

CodeWriter Corporation, 7847 N. Caldwell Ave., Niles, IL 60648 (phone: in IL 312-470-0700; rest of USA 1-800-621-4109).

AMBER WAVES

The Sakata CRT Display Amber Monitor features a composite video input signal, scanning frequen-



Sakata amber monitor has RCA jack.
READER SERVICE NO. 285

cy of 15.75KHz (horizontal) and 60KHz (vertical), resolution of 900 dots center and 800 corner, and a 2000-character display format. The 12" monitor, compatible with the 64 and VIC (and many other home computers) retails for $159.00.

Sakata U.S.A. Corporation, 651 Bonnie Lane, Elk Grove Village, IL 60007.

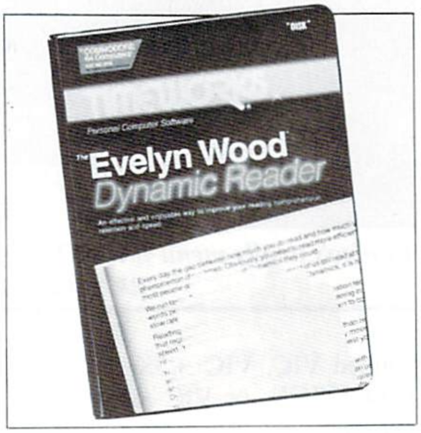
FINISHED READING THIS YET?

Ask any reading teacher and he'll tell you—don't try to learn speed reading from a book. You'll make some progress, but only in a classroom can you work with a controlled reader, the machine that projects lines on a screen and teaches you to take in bigger and bigger blocks of words with each glance. Software developers who couldn't read well enough to see "home computer" written all over that application, go back to *Dick and Jane*. And congratulations, Timeworks, for producing the *Evelyn Wood Dynamic Reader,* that rare computer program that makes a human application not merely faster, but *possible.*

Utilizing the same techniques as the famous course, the program promises to improve the dedicated user's reading comprehension, retention, and speed. Concentration techniques teach you to focus more of your mental capacity on your reading. The program includes quizzes to test your improvement, and colorful bar charts to record it.

Price of the C-64 disk is $69.95.

Want to learn to spell, too? You'll have to find your way out of the *Cave of the Word Wizard*, also from Timeworks. The crusty old necromancer will question you, in a clear human voice, on up to 500 words on 10 skill levels. Each time you spell a word correctly, the batteries in your flashlight will get a charge. On disk for the 64; $34.95.



Increased speed and comprehension.
READER SERVICE NO. 286

Timeworks, 444 Lake Cook Road, Deerfield, IL 60015 (phone: 312-948-9200).

PERSONAL WORD PROCESSOR

Call it reverse technology, but *Mirage Word Processor—Personal Version,* a stripped-down spinoff of their *Professional Version,* is designed for users with simple word-handling needs. Features include true word wrap, printed page/line/character counters, and block operations. The program accommodates all printer functions and can merge with Mirage's *Database Manager* to produce form letters. On disk for the 64; price is $39.95.

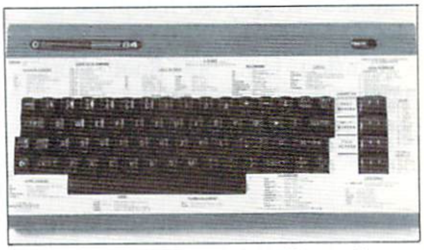
Mirage Concepts, Inc., 4055 W. Shaw, Suite 108, Fresno, CA 93711 (phone: in CA 800-641-1442; rest of USA 800-641-1441).

CRIBBING WITH LEROY

Sometimes, cheaters *do* prosper. Ask Leroy, whose lines of Cheatsheets for the C-64 and VIC 20 has swelled by 13 to 33. Each plastic template serves as a reference card for a particular program, placing commands, instructions, and other aids in easy view.

The new Cheatsheets are for *LOGO,* sheets 1 and 2 (advanced), *PILOT, Easy Calc,* 1526 Printer, *The Manager, Multiplan, Practicalc 64* (& plus), Epson RX-80 Printer, and *Superbase 64.* Non-product specific releases are *Sprites Only* (commands, locations, helps) and *Blanks* (three non-plastic coated sheets for the price of one). Each Cheatsheet $3.95 plus $1.00 shipping per order; PA residents add 6% sales tax.

Cheatsheet Products, P.O. Box 8299, Pittsburgh, PA 15218 (phone: 412-731-9806).



Psst! Look at Leroy's Cheatsheets.
READER SERVICE NO. 287

FIRMWARE

Sitting at a computer never did a thing for anyone's pot belly. But *Total Health* from PractiCorp may. Improved physical fitness inside and out is the goal of this program which monitors food intake and plots the effects that different combinations of food and exercise



Helps you learn to eat correctly, slim down, or fulfill a medical plan.
READER SERVICE NO. 288

will have upon your weight.

Caloric information is included for 200 foods, as well as data on carbohydrates, sodium, fat, and protein. For individuals on specialized diets, customized dietary data may be input.

The program makes it easy to set realistic goals, and calculate the number of days needed to achieve them. Graphs can be generated to illustrate results, for those dieters for whom a swelling or shrinking waistline is not graphic enough.

On disk for the C-64; price is $29.95.

PractiCorp International Inc., The Silk Mill, 44 Oak Street, Newton Upper Falls, MA 02164 (phone: 617-965-9870).

PRO-QUALITY KEYBOARD

Beginning on page 15, Peggy Herrington tells you all about the musical keyboards available for the C-64. Here's a late-breaking addition from Wersi Electronics, a leading organ and synthesizer manufacturer. Their $295, professional-quality Wersiboard is a full-size 49-note keyboard housed in an ABS plastic cabinet. Software will include *Mono 64* for monophonic synthesizer functions and *Poly 64* for polyphonic sounds. The keyboard plugs in via the cartridge port, so no special interface is needed. Software will be supplied on disk or tape.

Wersi Electronics, 1720 Hempstead Road, P.O. Box 5318, Lancaster, PA 17061 (phone: 1-800-233-3865).

BOUNCE PROTECTION

For the 64 from Comm Data: *Checkbook Manager* helps you balance your checkbook and keep track of a variety of expenses. Checks can be recalled by number, date, or category; after recalled, the program will provide a totalled account of that category.

Comm Data Computer House, 320 Summit, Milford, MI 48042 (phone: 313-685-0113).

MULTIPLE CHOICE

It's been observed that if the automobile industry had progressed at the same rate as the computer industry, we'd be paying $300 for a new car today. We can top that, though. If the computer industry had grown at the same rate as the *trivia* industry, we'd all be carrying mainframes in our thumbnails.

Trivia sales worldwide jumped from $600,000 in 1981 to $70 million in 1983 to a projected $1 billion in 1984. Of course, the computer industry is trying to catch up, with a host of new trivia game releases.

Trivia Fever from Professional Software consists of 3500 questions in seven categories: science and technology, geography, history, sports, films and entertainment, famous people, and nature and animals. You pick each question from among three difficulty levels, enabling trivia superstars to handicap themselves. The complete game is supplied both on C-64 diskette and in printed form, so it may be played without a computer. Add-on diskettes will cover various academic subjects. Price is $39.95.

Professional Software, Inc., 51 Fremont Street, Needham, MA 02194 (phone: 617-444-5224).

PQ—The Party Quiz Game from Suncom is played with four hand-held controllers on six-foot cables. Up to four players or teams therefore have access to the computer, eliminating the need for a "game master" to enter answers for all players as in other trivia games. Instead, when one of the over 2500 questions flashes on the screen, players race to answer first. Categories are chosen randomly from among history, politics, entertainment, sports, science, and more. C-64/Atari disk with four controllers, controller interface, and cables retails for $69.95. More disks will be added later this fall.



PQ—The Party Quiz Game ***comes complete with four hand-held controllers.***
READER SERVICE NO. 290

Suncom, 260 Holbrook Drive, Wheeling, IL 60090 (phone: 312-459-8000).

The Trivia Arcade from Screenplay adds another genuine twist: that of arcade-style play. You must enter the game arena by capturing a symbol representing the category of sports, music, TV, science, or general knowledge; each subsequent correct answer moves you toward the winner's circle. Retail price is $34.95; supplementary Question Pack I is $29.95.

Screenplay (Intelligent Statements, Inc.), 2300 E. Devon, Suite 151, Des Plaines, IL 60018 (phone: 312-699-8980).



Keep your keyboard spiffy clean.
READER SERVICE NO. 291

CLEAN MACHINE

While you cool off your disk drive, you can dust off your keyboard with Mini-Vac. The hand-held vacuum removes dust and debris from hard-to-reach places —like between your computer keys. Included are two interchangeable wands, two fine bristle brushes, and a cloth vacuum bag. The 6 oz. unit uses a 9-volt battery.

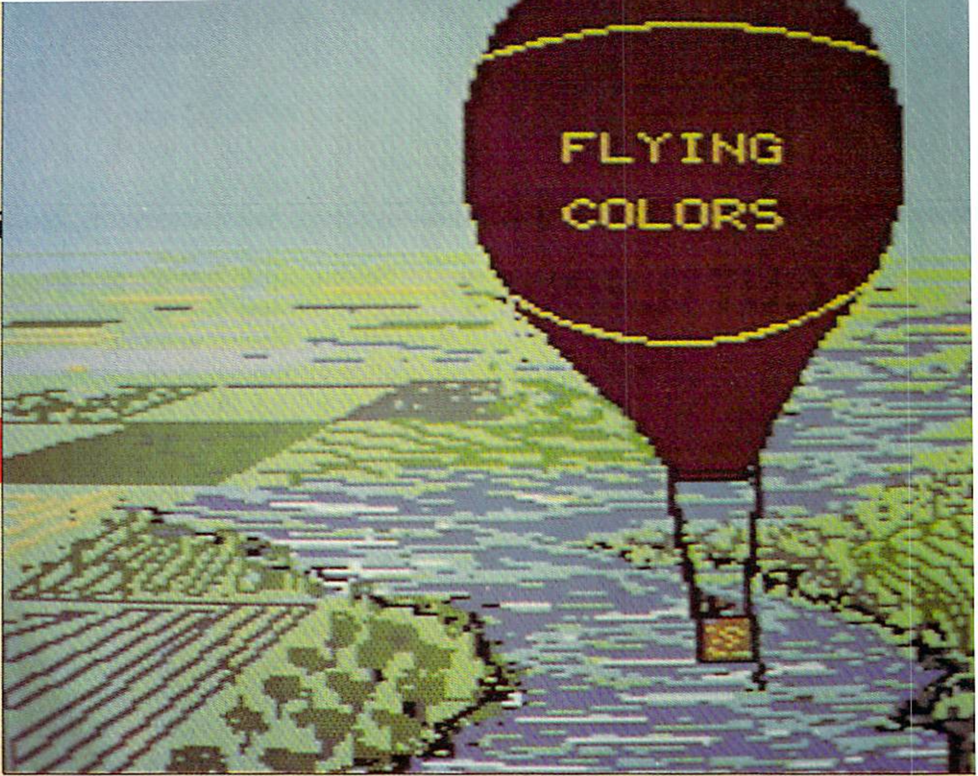
$29.95 plus $2.00 postage and handling from The Pine Cone, Blake Bldg., Dept. A-984, P.O. Box 1378, Gilroy, CA 95021 (phone: 408-842-7597).

MODEM TIMES

With telecommunications so hot that even your favorite Commodore magazine has entered the bulletin board jungle, we continue to fulfill our promise to keep you apprised of the latest telecom happenings.

The *Phone Call* telecommunications program equips your 64 for such tasks as home banking, electronic mail, data retrieval, and travel planning. A special feature, considering the program's $49.95 price, is the ability to upload and download ML programs.

Continued on page 14



Flying Colors ***is unique in that it lets the user choose between digital (joystick) or analog (paddle) input.***
READER SERVICE NO. 252

Our comparative review of graphics programs for the C-64 began last issue with *Paint Magic, Koala Painter, Picture Perfect, DOODLE!*, and *Peripheral Vision.* This month we conclude with reviews of *Flying Colors, Computer Crayons, Super Sketch, Flexidraw* and *Sorcerer's Apprentice.*

By Morton Kevelson

GRAPHICS PROGRAMS PART II

on the Commodore 64

Program Name: *Flying Colors*
Type: Multicolor 160 by 200 pixel
Input Device: Joystick, Paddle, Touch Pad
Price: $39.95
The Computer Colorworks
Division of Jandel Corporation
3030 Bridgeway
Sausalito, CA 94965
415-331-3022

OVERVIEW

Flying Colors includes the basic drawing features on our list. It lacks most of the frills found on many of the other packages. The program is controlled by an onscreen menu on the left side of the display. This menu can be toggled off with the f1 key to permit access to the underlying screen. The f1 key also aborts the current function, making partial fills possible.

Having an onscreen menu is a mixed blessing. On one hand, the up front display of the major program functions makes for a high degree of user-friendliness. On the other hand, the constant need to move the cursor to a menu selection tends to waste time as well as inhibit the creative process. The selection procedure was somewhat mitigated by a high speed cursor toggle with the f7 key. This allowed rapid onscreen cursor movement when the brush was in the up position.

Primary functions are displayed on the main menu. A secondary menu selects colors and brush size and shape. There is no restriction on the use of the sixteen colors beyond that which is built into the hardware of the Commodore 64. The change function on the main

Continued on page 92

SCUTTLEBUTT

Continued from page 12

Arrays, Inc./Continental Software, 11223 South Hindry Avenue, Los Angeles, CA 90045 (phone: 213-410-3977).

Total Telecommunications is a bundled package including a modem, intelligent modem software, and access to 52 databases. The menu-driven software allows for single-keystroke communications, eliminating the need for sign-ons, protocols, and codes. It features 300-baud auto dial/auto answer and auto log-on capabilities and reads and downloads text, programs, and data. For the 64; $124.95.

TeleLearning Systems Inc., 505 Beach Street, San Francisco, CA 94133 (phone: 415-928-2800).

Searchmart Corporation's free-access Software Library offers descriptions, prices, and other information on thousands of products. Why free? Because the information is provided in the form of paid advertisements by the software vendors. Call 305-845-6466.

Searchmart Corporation, 745 U.S. Highway One, North Palm Beach, FL 33408 (phone: 305-845-2996).

The BBS Log Book helps you keep track of such details as password, time on and off, access numbers, and dates when accessing bulletin board systems. There's also room for notes and upload/ download information. A directory area includes spaces to record numbers of various boards.

$5.95 plus $2 postage from Atmospheres, 1207 Eighth Avenue, Brooklyn, NY 11215 (phone: 718-788-6799).

JACK ATTACK

As you read in the papers, former Commodore CEO Jack Tramiel purchased Atari Corp. in July, fueling industry speculation on the inevitable head-to-head between the reeling giant and the company Tramiel had bulldozed into a billion dollar business.

Tramiel, predictably, has struck the first blow, filing a $100 million lawsuit in late August against Amiga Corp. that will delay Commodore's plans to bring out Amiga's eagerly anticipated computer.

It could be that the Great Micro War, thought to have been won conclusively by Commodore last summer, is due for a flareup. That's good for Commodore users. Because without competition, no one goes on giving 100% for long.

Continued on page 23



PLAYING THE COMMODORE 64

BY PEGGY HERRINGTON

Making music with the 3-voice music synthesizer in the Commodore 64 is a chore most of us have tried once or twice, if that. It's tough. I know programmers who've learned to do sophisticated things with sprites but who won't tackle polyphonic SID programming because they don't have a musical background. Writing music programs in BASIC, not to mention machine language, can swamp you in pokes, numbers, and loops faster than you can whistle Dixie.

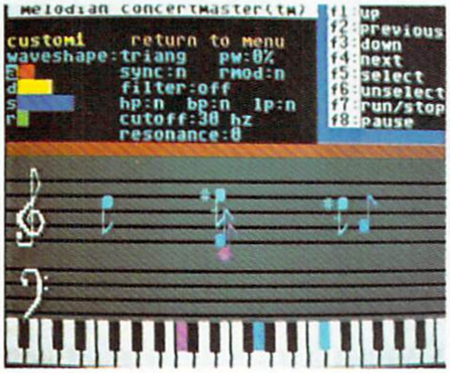
That is, until now. Exciting new products from three independent companies have made music-making on the 64 so painless it's fun! Playing the C-64 is easier than playing a piano because you don't have to concern yourself with speed, technique, or using more than one finger at a time. And the software, most of which works with or without a musical keyboard, revolutionizes the process of playing an instrument. So if you've got a song in your heart and a Commodore 64, now hear this...

MELODIAN

I found the new piano-type keyboard from Melodian, Inc., to be the most playable. With accompanying disk and documentation, it retails for $200. This 37-key, full-sized, three-octave polyphonic keyboard looks and plays a lot like a compact electric organ. It plugs into the user port and game port 2 on the C-64...and it's *big.* I had to rearrange my desktop to fit it there with the computer, monitor, and disk drive. But I forgot all about that minor drawback when I laid hands on it. *ConcertMaster,* the disk which comes with the keyboard, is one of the friendliest programs I've ever seen. It turns your C-64 into a dedicated music synthesizer (which means you can't access other computer functions) and includes some fancy music-making features.

The bottom half of *ConcertMaster*'s main screen is a treble and bass staff upon which the notes, color coded to distinguish the voices, scroll past as they sound, both as you play them on the keyboard and when recorded music is played back. A graphic reproduction of the piano keyboard can be toggled on and off at the bottom of the screen. The top half of the screen displays the commands, all of which are controlled by the eight function keys, and there's a menu on the screen at all times. The system is so easy to use that I didn't need the documentation after I'd played it once or twice. You flip through the op-

ABOVE: **Kawasaki Synthesizer** *(Reader Service No. 262), companion software to the Incredible Music Keyboard.*



ADSR screen of Concert-Master *lets you use function keys to control attack, decay, sustain, and release. READER SERVICE NO. 259*

tions with the f1 and f3 keys (it's sort of like using the cursor keys, the option you're "on" is in reverse video) and you select the feature you want by hitting f5.

There are several very nice prerecorded songs and sixteen different "pre-sets" for various musical voicings on the *ConcertMaster* disk. You can alter these pre-sets or design your own by going to the second, or ADSR screen. There you use the function keys again to control sliders for attack, decay, sustain, and release as well as selection of waveform, filtering, and ring modulation or sync. One of *ConcertMaster*'s best features is that you can change any and all of the sound parameters on any of the three voices while the music plays and hear the effect instantly.

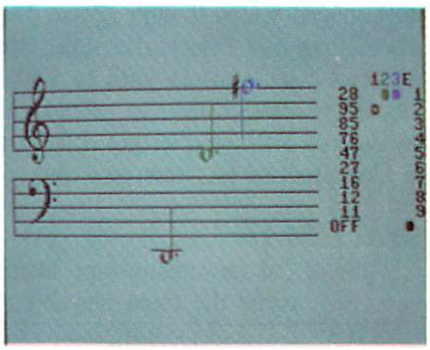
A music synthesizer such as this may sound interesting to you, but it's easy to underestimate its power and versatility, particularly if you've never played around with one. You may even be wondering why the ubiquitous piano wouldn't serve as well. The differences between a piano and a synthesizer are vast. Actually, the only reason the two are associated (other than the fact that they're both musical instruments) is because of the black and white keys on the musical keyboard. This particular type of human interface—the keyboard—is attached to a synth because it's popular, convenient, and a relatively easy-to-learn method of activating sounds. You don't have to use a keyboard. There are professional digital guitars available now (but not for the C-64) which allow strumming or plucking of strings to activate the synthesizer. Playing a synth isn't at all like playing a piano, even with a keyboard.

The Melodian system has a built-in metronome. You can set it to tick much slower than the tempo of your finished music, select record for track 1, and play the notes for voice one on the musical keyboard in time with the metronome. The notes show on the screen and are recorded automatically as you play. Then you play back track 1 (with or without the metronome) and record voice two on track 2. You can hear tracks 1 and 2 as you record track 3. Adjust the playback speed to tempo (it won't affect the pitch) and try out various instrumental combinations as you listen to all three voices together. Once you've found the right combination, sit back and listen as the notes scroll by. You can record two or three voices at once if you don't want to differentiate between instruments. You can save your music to disk.

The only method of note entry with *ConcertMaster* is via the musical keyboard. In other words, you can't type in program lines. The *ConcertMaster* disk is available without the keyboard; you can use the C-64 keyboard to play the notes. The only accidentals are sharps because pressing the black key between C and D, for instance, could mean either C sharp or D flat and there's no way (nor need, except for aesthetics) to differentiate. The program is unusually flexible. You're not locked into bar lines or key or time signatures, and since the music is recorded in real time, there's no need for them either. The music notation is attractive and is standard with one exception. Only two note durations are shown, quarter or eighth notes. While the keyboard was responsive to exceedingly brief durations and the C-64 was able to play back even grace notes accurately, the notes on the screen were only suggestive of their durational values.

Melodian promises a full line of musical software and has two music education packages which work with this keyboard. *RhythmMaster* does show accurate note durations and teaches timing by way of a game with various skill levels. *MelodyMaster* is based on a similar concept but teaches pitch with computer generated notes shown on a staff which the student must play on the musical keyboard. I'm a pianist and I had some trouble with the upper levels on both of these programs. If you're a dedicated musician (or want to learn to be one) this is the keyboard music system you want.

It's fun, challenging, and educational, and for playability and ease of use it is nothing short of



Standard musical notation from **Music Processor.** *Lyrics can be programmed in two lines at a time underneath. READER SERVICE NO. 260*

spectacular.

INCREDIBLE MUSIC KEYBOARD

If you're interested in coordinating sound with graphics, Sight & Sound Music Software, Inc. has just what you need. Their *Incredible Music Keyboard* fits over the case of the C-64, turning the top two rows of the computer into a miniature 24-key, piano-type keyboard. The disk which comes with it allows you to play (but not save) three SID voices at the same time (polyphonic) with piano, synthesizer, or bass sounds in eight octaves. It also comes with two books: one for the beginning musician and the other for the advanced, all for $49.95. But that's only the beginning. Sight & Sound has two separate series of music and graphics programs which interact with each other and this little keyboard, and although each program will operate alone, they make for some mighty powerful combinations.

The *Music Processor* ($34.95) and *Music Video Kit* ($39.95) along with several *Computer Song Albums* ($24.95 each) constitute one series which works with the Incredible Music Keyboard. Music composition is done with the *Music Processor* which, incidentally, has the best display of standard music notation I've seen yet for the C-64. The program will automatically record music played on the keyboard one voice at a time. You can change octaves and preset voices with the function keys without missing a beat. Then you press M to get back to the menu followed by f5 to get to the built-in music editor and you can list what you just played. Voila! There are the program lines all neatly entered, which you can alter or print out (just type plist). Or you can forget the music keyboard entry and write a program with music editor commands, using note names A through G, octave numbers, and note durations. For example, a middle C quarter note is C4Q. It will even automatically number your program lines. Commands like merge and append combine three voices entered separately into one polyphonic piece in seconds. Don't like the key you entered the music in? Transpose it to any other key and the notation on the screen will accurately reflect the new key with both key signature and accidentals—including sharps and flats. For fixing troublesome areas within your program you can use commands like find or fast forward, or step through your program one line at a time. You can program song lyrics to be displayed two lines at a time under the music notation as the song plays, and syllables can be highlighted in time with the music. And it's all done in a simple, straightforward manner.



Incredible Music Keyboard *does a number on your 64.*
READER SERVICE NO. 261

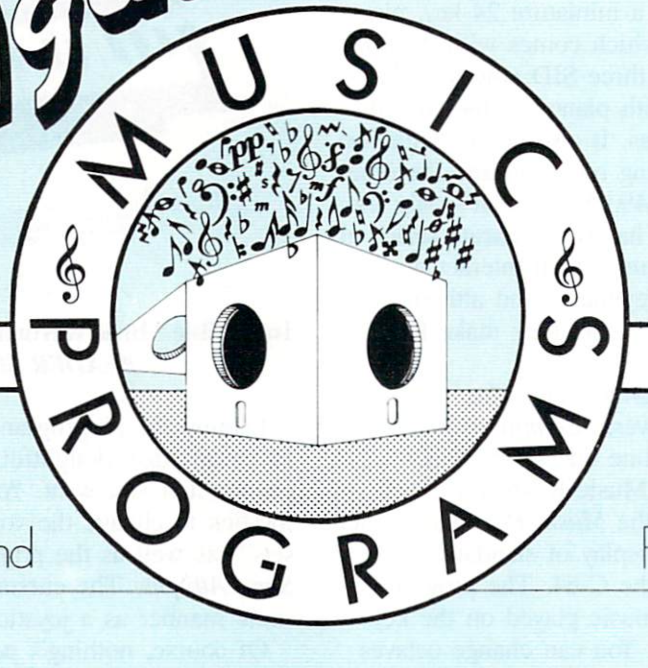
I found the preprogrammed music on the *Music Processor* disk delightful, but you can list and change it if you want. An optional feature uses a joystick to change the voicings (there are 99 "presets") as well as the popular music on the *Computer Song Albums.* The cursor controls will operate in the same manner as a joystick.

Of course, nothing's perfect for any one of us, and I have two problems with this Sight & Sound series. The first deals with the keyboard itself. It's cute and the miniature keys are adequate. They function quite accurately and the overlay is stable and durable enough. And maybe it's only because I'm used to a piano, but I would definitely have preferred a keyboard with full-sized keys. The other problem is with the notation display. It is colorful, accurate and, yes, even dazzling, but only the notes being sounded are displayed. The instant a chord quits sounding the notes are replaced by the next vertical set (in fast music they take on an animated quality) and this entirely negates any sense of horizontal voice-leading, an important aspect of harmony. This isn't a major problem and I doubt that it will bother any but the formally trained musician. It's just that the Sight & Sound notation is so close to perfect!

I haven't seen the completed *Music Video Kit* which will provide the utilities to coordinate graphics with music done with the *Music Processor.* There are samples of what it will do on several of the *Music Processor* preprogrammed songs, and *Kites* is especially nice. *Music Video Kit* allows enhanced access to all C-64 graphics features—keyboard, hi-res,

Continued on page 55

Play It Again SID...



MUSIC PROGRAMS FOR THE C-64

By Cheryl Peterson and George Bitzer

Jo Ann Case

The growing number of music programs available for the C-64 makes it difficult to decide which to spend your money on. Our aim in this article is to make it easier. To cover all the applicable software would require most of the pages in this magazine—and most readers wouldn't want to spend the many hours required to read such a lengthy analysis. So we've gathered a representative sampling and will compare the key features.

One aspect of music programs that few reviewers are qualified to evaluate is their professional capabilities. Since one of us is a studio musician, we won't hesitate to point out strengths and limitations of interest to working professionals.

Cheryl Peterson contributes regularly to a number of home computing magazines. George Bitzer is a professional keyboard player who has appeared on albums by the Bee Gees, Andy Gibb, Dionne Warwick, and Kenny Rogers. On his latest project, a solo album by Barry Gibb, he helped write and produce, as well as play synthesizers and piano.

Several programs are capable of turning the C-64 into a functional music synthesizer. By reprogramming the typing keyboard to function as a musical keyboard, these programs make it easy to enter songs. In one mode the music is "recorded" into memory. In another, the previously entered song is played back. *MusiCalc, Ultisynth 64, Studio 64,* and the *Voice Box* program work in this manner. They also allow the songs to be saved in a disk file for later access.

MusiCalc, Studio 64, Music Construction Set, and *Master Composer* have the user enter music into a musical staff. (Yes, *MusiCalc* and *Studio 64* have two modes of input.) The input can then be edited in much the same way that words are with a word processor. Measures can be duplicated, erased, moved, or written out to a new file. By combining parts of old songs, it's possible to create new ones.

We aren't going to try to educate you about waveforms, ADSR, filters, and all the other things you can do with sound using the 6581 (SID) chip in the Commodore. Instead we'll recommend David Barron's *Unraveling the Mysteries of Sound* in the August and September issues of *Ahoy!*

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If not completely satisfied, return MusicMate to Sequential within 10 days for full refund. (Sorry, no returns on computer software, once opened)

Mail order form to: Sequential, 3051 North First Street, Dept. XB, San Jose, CA 95134 Or, use our order line (408) 946-0226.

Reader Service No. 294

For our purposes, let's take a look at the programs one by one, starting with those that are especially suited to children.

DANCING FEATS

This is the program with the most original form of input. After making choices from a few menus, the joystick becomes the musical instrument. It will play a different note depending on which of eight directions it's moved in. Because the early menus set the beat and the key of the song to be played, the joystick will play only notes that are in harmony with the preset key and in time with the preset rhythm. This means that the music played is in tune.

This program is easy to use, and great to get children started experimenting with the computer. The main menu has five options: choose bass, choose beat, choose style, choose tempo, and choose ending. Even the menu choices are made using the joystick. A note appears to the left of the options. By placing the note in front of your choice and pressing the fire button, that option is selected. Each option has a submenu where the same procedure is followed.

When you finally start playing, you can record the song to memory. When done, the song can be saved to disk or cassette. Since the program is so easy to use, the documentation is correspondingly slight. In this case, it is adequate, not overdone.

SONGWRITER

A close second for originality of input, *Songwriter* most resembles a player piano, the kind that plays songs punched on a roll of paper. As the notes on the paper scroll by the play area, the appropriate keys are struck.

The main screen looks like a piano keyboard. A cursor is positioned on one of the keys; by using the left and right bracket keys the cursor is moved back and forth on the keyboard. To play any of the notes, you put the cursor on the key and hit RETURN. The note will sound. Pressing the space bar "punches" the note onto the paper roll on the screen. A blacked-out square appears above the note you chose on the keyboard and the scroll moves up a notch.

If a joystick is plugged in, it can be used to move the cursor back and forth. Moving the joystick up and down plays the preceding or succeeding notes, and pressing the fire button records the note on the roll. That's it. You keep entering notes until the song is finished.

Of course, there is more to it than that. There are commands to change the duration of the notes, the tonal quality of the sound, the song's speed, and other factors. Songs can be saved to or loaded from disk.

The most outstanding feature, though, is the documentation. *Songwriter* will actually help to teach children musical theory. The instructions are some of the best I've read. The tutorial approach used is perfect, with suggested activities to really get the youngsters interested in what can be done with music.

Also, the disk is write protected, so little fingers can't accidentally destroy the program.

EARLY GAMES MUSIC FOR CHILDREN

This program's name about says it all; a group of games that encourage children to explore new sounds through the Commodore keyboard.

This menu-driven software is very easy to use. The program has a "perform/record/playback" mode that turns the top row of keys into piano-type keys. A musical staff appears on the screen and each note is entered into the staff as it is played. Pressing the space bar starts and stops the "recording." The recorded song can be saved on disk. Of course, this would be useless if the songs couldn't be loaded in. Before using the load function, it's a good idea to check the catalog that lets you look at the directory to find out what songs are available.

One game, *Guido's Quiz,* teaches note recognition by showing a question mark on a staff and expecting the child to key in the correct letter. Another game, *Melody Tutor,* plays a melody and then plays the first note. When the corresponding note is played on the keyboard, the program goes to the next note. This time it plays the first two notes. When the first two notes have been played correctly, it will play three and so on until the whole song has been learned. If a wrong note is played the tutor displays the error and waits for the song to be replayed.

The last game, *Kaleidoscope,* works similarly to "perform/record/playback." As the music is played, though, graphics appear on the screen as each note is struck. Sometimes a visual cue is a nice accompaniment, especially for the very young.

One warning about this program. We successfully loaded it once, tested the modules, and set it away for a while in a safe place. When we came back to it to refresh our memory, it loaded, *but* we got a disk drive error light. We tried using the program anyway, but only the first two modules worked. Another writer has experienced the same problem, so we recommend caution with this program. The problem could have been caused by the program trying to write a song to the original disk. Since the disk is

not write protected, it is possible to write a file on the master disk. This is a serious flaw if it is indeed what happened. Although the documentation clearly warns not to save files on the program disk, youngsters *can* accidentally access the save module. Without a parent looking over their shoulder every minute, it is bound to happen sooner or later.

That's it for the youngsters. Let's take a look at the packages that wouldn't interest a professional musician but might be useful to a programmer who wanted to put sound effects or music into his latest creation.

SYNTHY 64

This one doesn't really help to put music into another program, but it takes a programmer to be able to use it. You enter music by using BASIC-type statements complete with line numbers. You type the letter of the note you want, the octave of the note, and the duration. If you want to add a modifier, you designate sharp, flat, or natural. You can go as short as a 64th note or as long as a whole note. Notes can be tied or modified to make triplets.

You can also program special instruments to be assigned to any of the three voices. By having a special section assign the values for the waveform, ADSR, and filters, you can get different instrument sounds.

Suited to someone who enjoys programming and thinks of music as just an extension of BASIC.

NOTEPRO II

NotePro II has all the options necessary to create usable music. It uses a modified musical notation to represent notes being entered on a scale. You can choose treble or bass clef. Using 8 measure sections, you enter the notes to be played by each voice. The three voices are color coded, making it easy to tell which note represents which voice.

In order to change the quality of the sound, you

Continued on page 52

FEATURES OF C-64 MUSIC PROGRAMS

	Dancing Feats	Songwriter	Early Games Music	Synthy 64	NotePro II	Voice Box	Studio 64	Untisynth 64	Master Composer	Kawasaki Synthesizer	Music Construction Set	MusiCalc
Uses standard musical notation	Y	N	N	N	N	Y	Y	N	N	Y/N[3]	Y	N
Volume adjustable by voice	N	N	N	N	N	Y	N	N	Y	N	N	Y
3 voices, chords possible	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
ADSR controls	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Sync and ring	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Key changes possible in song	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Triplets	Y	N	N	N	Y	Y	Y	Y	Y	Y	N	Y
Pre-programmed instruments	Y	N	Y	Y	N	N	Y	N	Y	Y	Y	Y
Create new instruments	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Sample songs	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y[4]
Print out in musical notation	N	N	N	N	N	N	N	N	N[2]	N	Y	Y
Optional controller	J	J	N	N	N	N	N	N	N	KB	J,KP	KB
Metronome, beat counter	Y	N	N	N	N	Y	N	Y	Y	N	Y	Y
Multiple octaves	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y
Teaches music	N	Y	Y	N	N	N	N	N	Y	N	Y	N
Record/playback with visual cues	Y	Y	N	N	Y	Y	Y	N	Y	Y/N[3]	Y	Y
Waveforms	N	N[1]	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Filters	N	N[1]	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Keyboard or immediate mode	Y	N	Y	N	N	Y	Y	Y	N	Y	N	Y[5]
Menu-driven	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y

Notes:
[1]Adjustable but not identified as filter and waveform adjustments.
[2]Printout is in a modification of standard notation.
[3]Yes in *Performer;* No in *Composer.*
[4]*MusiCalc 2* module.
[5]*MusiCalc 3* module creates specialized keyboards.

S.O.S.

BY DAVID BARRON

YOUR PROGRAMMING MAYDAYS ANSWERED

Since *Ahoy!*'s inception, we've enjoyed responding personally to as many of your technical questions as our schedule has permitted. Recently it occurred to us that those questions with the most universal appeal could best be answered in the magazine, where all of our readers could benefit from the information provided. And that's how our latest column, *S.O.S.*, came to be.

If you'd like to see *S.O.S.* in every issue of *Ahoy!*, write to tell us so. And even more important—send your questions to *S.O.S.*, c/o *Ahoy!*, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.

I would like to produce some simple business forms having squares, rectangles, underlines, overlines, and perhaps other shapes or figures. I have yet to find a guide that will help in matching the vertical and horizontal, skinny, slim, and fat lines on the key faces into something useful. I know they weren't put there without a definite purpose. Far from giving directions on how to use the symbols, the *64 User Guide* and *64 Programmers Reference Guide* seem to gloss over their very existence.

Keith Lindsey
Fort Worth, TX

The graphics characters are designed for just the purpose you want to use them for—the construction of simple business forms and the creation of designs for games. These may be implemented by means of a print statement, or placed directly onto the screen by means of a POKE command.

Most of the programs in Ahoy! *use the graphics characters to form designs. By looking over these programs you may gain insight into the use of these characters.*

Could you or any of your readers tell me what I would need to set up a bulletin board using a VIC 20?

I recently started using a C-64 computer and have "retired" my VIC for the time being. I would like to take it out of mothballs and set it up as a bulletin board, as there are none in the immediate dialing area. Unfortunately, I know little about bulletin boards at present. I do understand that a fully expanded VIC can function as a bulletin board, and that is what I have. I also have a spare disk drive to use with it. All I need is the modem and the software to make it run.

Fred S. Dart
Salem, UT

Recently a multitude of BBS's (Bulletin Board Systems) have been popping up around the country. Almost any computer with enough memory and disk space can serve as a host for a BBS. As far as modems are concerned, I would recommend one that sends a very strong carrier and is sensitive to weak carriers. This is necessary, since you may assume that people will be calling your system from far away and will obtain weak connections otherwise. The modem must also be of the auto-answer type.

I'm not aware of any commercially available software to run a BBS on the VIC 20. If any reader knows of an available package please let us know.

I am 44 years young and have first discovered the world of home computers. I bought a Commodore 64 at Christmas only to find that I could do nothing with it.

Boy, was I ever under the wrong impression about computers! I find that I not only have to learn a new language, but I also have to learn how to type!

I have an idea that might help people decide to buy a color monitor instead of a TV. It is my belief that a color monitor can be hooked up to a cable TV, as they provide a tuner anyway. Like many others, I can't afford to find out by means of trial and error. Maybe you could help me out a little.

Jerry R. Onerluf
St. Am, MO

It is true that most cable TV systems supply you with an external tuner, but these tuners provide an RF (radio frequency—the type picked up by an antenna) signal. A color monitor requires a video signal (the type sent out by most computers) to operate.

The only way around this problem is to use a VCR in between the monitor and tuner. Most VCRs provide separate video and audio outputs of the in-

coming signals. This may be routed to the monitor which will then display the TV image.

I presently own an MX-80 Epson printer with an 8145 RS232 interface card installed in it for interfacing to an existing HP computer via RS232. I would now like to interface the same printer (without removing the RS232 card, since I will interchange the computers with the same printer) with a Commodore 64 computer. Can you suggest a hardware product to do this, preferably one with few or no software commands?

Todd Walton
Vicksburg, MS

What you need is an RS232 printer interface for your Commodore 64. I suggest that you purchase the one made by Commodore.

As far as ease of use is concerned, you will have to POKE into a few memory locations to set up the proper parameters for communications, but after you have done that, operation will be as simple as with a regular printer.

A friend and I both bought VIC 20 computers and datasette recorders. The problem is that when I type in a program, save it, and give it to my friend, he can't load it. He gets all kinds of error messsages. The same thing happens to me when he gives me a program that he saved.

What's causing the problem, and how can I correct it?

Victor Passimenti
New York, NY

It sounds as though your datacassette recorders are so different in their alignment that they are recording data on different places on the cassette tape. One is probably severely misaligned and should be adjusted by a professional.

To find out which one is worse, find someone else with a datasette and a VIC and test tapes from each of your datasettes on it. It's been my experience that no two datasettes are exactly alike (many counters are significantly off), but none should be so poorly assembled that it is totally incompatible with others. □

SCUTTLEBUTT

Continued from page 14

IT DOES COMPUTE

The C-64 has made it possible for millions of users to have a word processor, a music synthesizer, and many other modern marvels once available only as dedicated units costing thousands of dollars. Add personal robot to the list.

And while NOMAD from Genesis Computer is not equipped to vacuum or fetch a martini, it can teach the student who maneuvers him the same kind of logic that's needed for writing programs. The aluminum-chassised plastic robot plugs into the 64's RS232 port with a 25-foot cord. It can move forward, back, left, or right, and detect objects in its path or do ranging via ultrasonic "eyesight."

Price is $179.95; an optional cartridge that adds NOMAD control commands directly to the 64's BASIC is $39.95.



NOMAD moves in four directions via stepper motors.
READER SERVICE NO. 295

Genesis Computer Corporation, 1444 Linden Street, P.O. Box 1143, Bethlehem, PA 18018 (phone: 215-861-0850).

PLANT YOURSELF

Think software prices are high? Have you looked at tomatoes lately? But now C-64 users with the faintest tint of green to their thumbs can grow their own with K-tel Software's *Plantin' Pal*. The program will help you design a garden layout around irregular shapes, trees, perennials, and the like, provide watering, fertilizing, and insect-beating tips on 40 different vegetables, and customize your garden for the part of the country you live in.

K-tel Software, Inc., 11311 K-tel Drive, Minnetonka, MN 55343 (phone: 612-932-4112).

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Electronic Spread Sheet	$59.95	$49.00	$39.00
Accounting Pack	$49.00	$39.00	$29.00
Practicalc	$59.95	$46.95	$39.95
Programmers Reference Guide	$20.95	$16.95	$12.50
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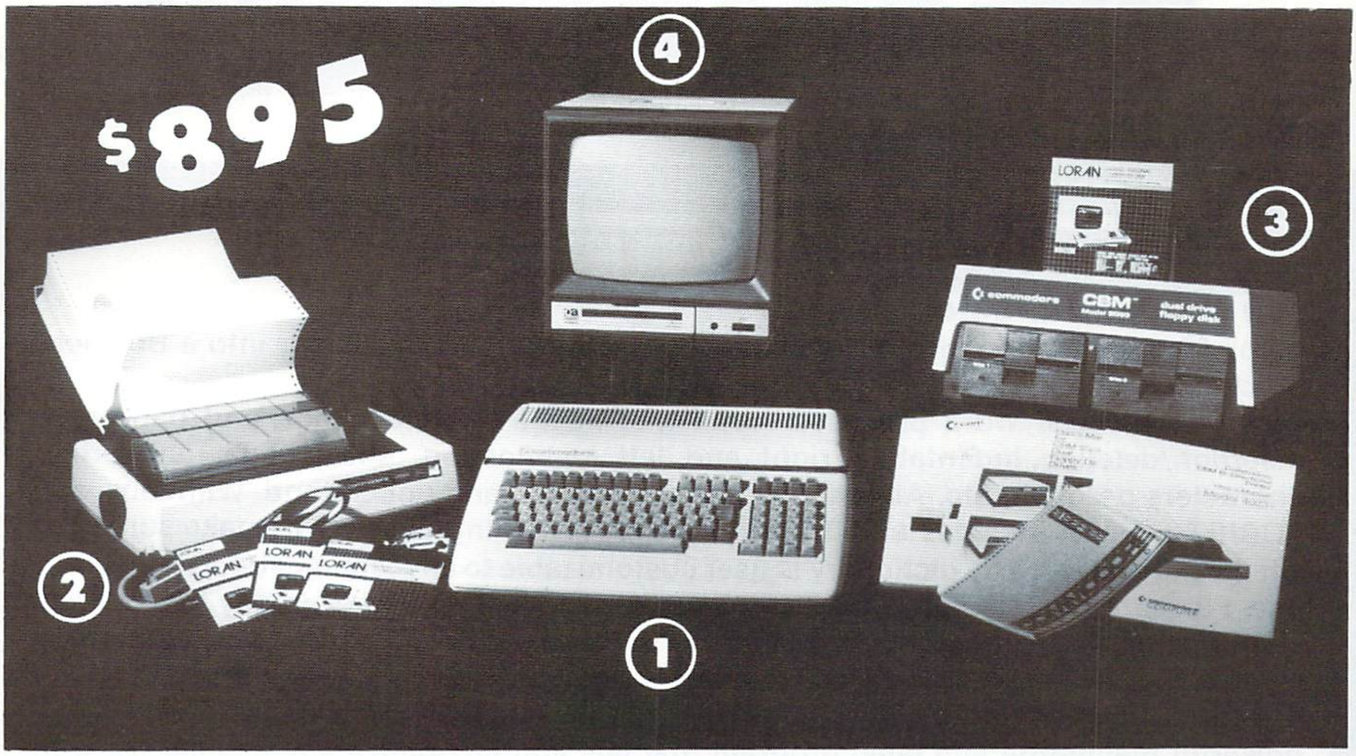
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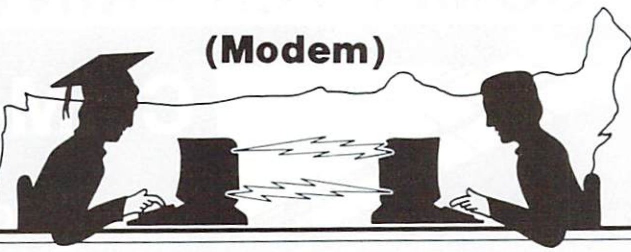
15 DAY FREE TRIAL. We give you 15 days to try out this SUPER SYSTEM PACKAGE!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!!
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Commodore 64

(Modem)



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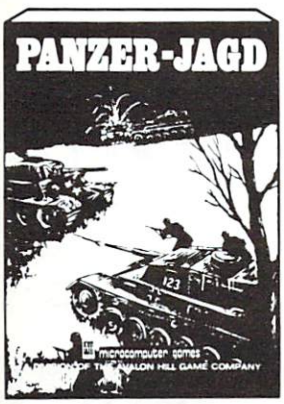


Telengard-Real Time. This is the game all the dungeon fans have been waiting for. Use wits, magic, and fast thinking to overcome the 50 levels of the TELENGARD. Fantastic graphics and action. (Disk.) List $29.95. **Sale $19.95**. (Tape.) List $24.95. **Sale $16.95**.

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Commodore 64

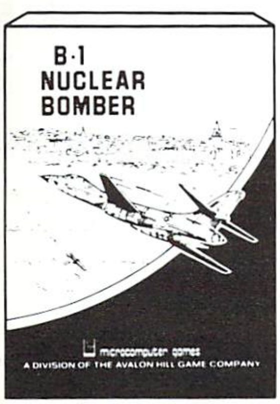


Panzer Jagd. Fantastic tank simulation puts you in the German seat forced to secure the area of the Russian front. If you succeed your remaining units are saved for the big battle. See if you can rewrite history or make the same mistakes. (Great playability.) (Disk.) List $29.95. **Sale $21.95**.

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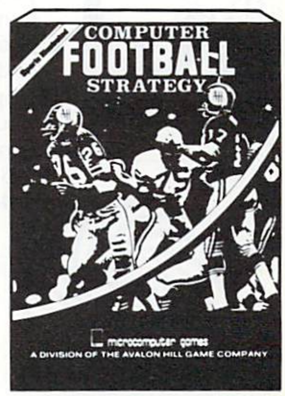


Commodore 64



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Commodore 64

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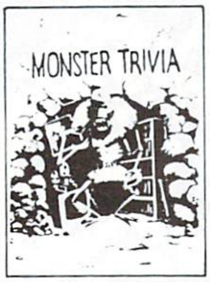
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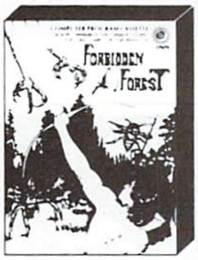
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Two hot selling home/office management systems in one package. Includes both a powerful word processor and a database storage program. Available in both cassette and disk.
List $34.95. **Sale $24.95.**



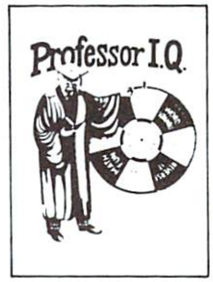
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A hot new concept for home and computer buffs. Over 2000 trivia questions in six categories for one to four players. With exciting high resolution graphics, colors and sounds. Available in both cassette and disk.
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Only your skill as an archer can protect you! Giant spiders, enormous bumblebees, huge leaping frogs, a phantom protected by killer skeletons, and even a fire breathing dragon try to stop you. All in stunning 3-D graphics. You'll feel like you're part of this one. Fantastic all the way around. (Tape.) List $16.95. **Sale $12.95.** (Disk.) List $21.95. **Sale $16.95.**



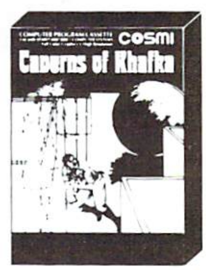
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This educational game is designed in an exciting, fun filled format, automatic handicapping challenge includes Word Scrambles, Math Fun, Puzzle Time, Reverse It and Strategy. Available on cassette and disk for one or two players. (Tape.) List $16.95. **Sale $12.95.** (Disk.) List $21.95. Sale $16.95.



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You are a member of the powerful Aztec tribe. To avoid sacrificing yourself to the gods, you must compete in and complete the deadly AZTEC-OBSTACLE-COURSE. Seven phases with increasing levels of difficulty make this course challenging and keep you going for hours.
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REVIEWS

VOCABULARY BUILDER II

PDI
C-64
Disk, cassette

Back in the dark ages of BPC (Before Personal Computers) it often took 30 days before you had a more powerful vocabulary. All you had to do was read the book! Today you can achieve that goal in 10 daily lessons with PDI's *Vocabulary Builder II* (a follow-up program to PDI's *Vocabulary Builder I*).

Frogger it's not! More like Nautilus of the mind, and just about as many laughs as pumping iron. This is a no-nonsense educational program with one aim in mind: increasing a person's understanding of word meanings. Suggested grade levels include 6th through 12th.

The first five lessons concentrate on synonyms. There are 40 problems on each level. Example: Which word is most similar to *illustrious:*

a) momentous
b) pained
c) menial
d) grotesque
e) celebrated

The lessons get progressively more difficult, and by Level 5 you might be scratching your head trying to figure out if *abjure* is synonymous with conjoin, uphold, sanctify, renounce, or strike. (Why of course, renounce!)

Then, just when you've got synonyms licked, Lessons 6-10 introduce antonyms. They're fairly easy at the start. Example: The antonym of *treason* is:

a) allegiance
b) safeguard
c) ransom
d) witticism
e) avarice

They get harder as you move along, and by Level 10 you're trying to figure out if *abject* is the opposite of inspired, receptive, baffled, premature, or exalted. (Can you guess?)

Ten days later when you've completed the whole program you should be starting to dazzle your English teacher. Your Mom and Dad are so impressed with your new vocabulary they've even increased your allowance! And most important, it's time for the Big Test which follows lesson 10 and incorporates all you've learned.

And let me hasten to add, this is no lightweight test! There are 20 questions, in each of which you're asked to identify the word that is the synonym, or lacking that, the antonym. Example: *dilatory*

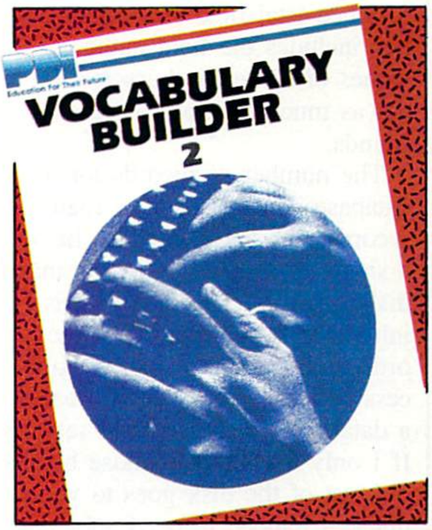
a) disparate
b) narrow
c) prompt
d) constricted
e) inept

And inept was just about how I felt upon completing the test! Because the answer sheet only indicates correct and incorrect answers. On those you've missed it does not indicate the correct answer. And if you want to find out the proper choice, the incentive is obviously to return to Level 1 and start again.

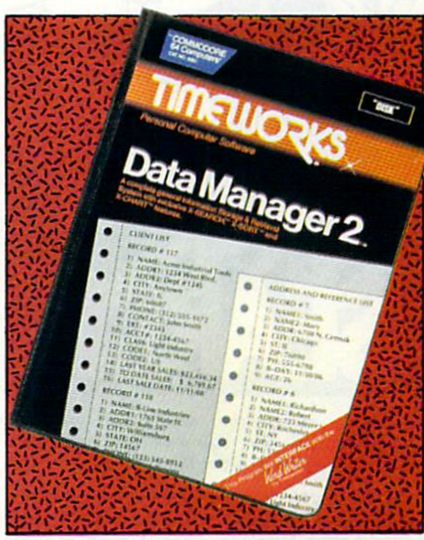
It conceivably will take you a lot longer than 10 days to increase your vocabulary. But it's worth the effort for the SAT's, and with *PDI Vocabulary Builder II* you have a handy tool to do it.

Program Design, Inc., 95 East Putnam Avenue, Greenwich, CT 06830 (phone: 203-661-8799).

—Valerie B. Tamis



READER SERVICE NO. 250



READER SERVICE NO. 251

Movies often have sequels—why shouldn't vocabulary and database programs?

DATA MANAGER 2

Timeworks, Inc.
Commodore 64
Disk; $24.95

Timeworks' *Data Manager 2* is a useful database program for home and small business. It is slow, and somewhat limited for larger businesses, but for the price it's a dandy. The program is easy to use, well-documented and has a number of powerful features.

The bottom line on a database program is the size of records and fields. *Data Manager 2* does pretty well. Individual records may be 230 characters. Each record may have up to 20 fields, and fields may be up to 32 characters. Numerical fields may not exceed 9,

and date fields are automatically 8. Since total field size for characters includes the field name, field names of up to 15 characters is not as much of a bargain as it sounds.

The number of records for a database depends on how many records of a particular size fit on a single disk. One limitation that I dislike is that each data disk is initialized by writing blank records on an entire disk. This process takes 8-10 minutes. I created a database which has 1744 records. If I only used 200 of those blanks, the rest of the disk goes to waste unless I happen to need another database with exactly the same record configuration.

Another important feature of a database is its search capabilities. In *Data Manager 2*, you can search for a string in any field. When I looked for "game" in my database, it gave me records with subjects like "adventure games," "writing games," and "video games." If the search only matched the initial words in the field, I would have missed all these. The value of transferring my card index of magazine articles to this database suddenly became apparent.

Besides a string search, you also search for a number or date range. X-SEARCH is a useful feature which lets you narrow your search when you have a large database. If you searched for everyone named "Smith" on your first pass, you could then search all the Smiths for those who live in Chicago, and are under 30.

You can sort records on any field in ascending or descending order. *Data Manager 2* has special sort programs for dates and numbers. Sorts are moderately fast, but take much longer for large databases. Sorts are performed on a special pointer record called X-SORT which is part of each data disk.

Statistical analysis is an interesting option. You can do an analysis of a database section using a single numerical field. The statistical option reports the number of records used, high and low records, sum, average, standard deviation, and increment. Once you run the statistics, *Data Manager 2* can also display a bar chart showing distribution of the data.

You can also do simple field calculations. You specify two operand fields and a result field and add, subtract, multiply, or divide. You cannot specify a formula, and probably need to be careful using this feature with subtract and divide.

As a stand alone product, *Data Manager 2* doesn't produce reports. It has a "print screen" feature which is handy, and can print out a range of fields in particular records. However, if you interface this program with another Timeworks product, *Word Writer*, data from *Data Manager 2*'s databases can be used for a mailing list, form letters and special reports.

Data Manager 2 is easy to use. The user's manual has an excellent tutorial, and the package includes a sample database saved on the reverse side of the program disk. By the time you practice on this sample, you are familiar with what the program can do. The manual does not have an index, but I found everything I needed to know by using the detailed table of contents.

My only complaints are minor. You cannot enter a blank field. Even if one field in a record is not needed for every record, you must enter something. If you enter characters in a number field, the program won't continue until you do it right. Error trapping is good. After each record, you get an op-

portunity to change anything you got wrong.

Almost everything you do is updated, at 10-15 seconds a whack. Entry and movement in the database is fairly slow. When you complete work in a database, you must reload the main program to use another database disk.

Larger database programs have many more powerful features than *Data Manager 2*. However, they are also much more expensive and, usually, more difficult to use. If you wonder whether you have any use for a database program, this package is a good way to find out. It's cheap enough to be expensed for its education value. It's easy enough to use without getting discouraged. It's powerful enough to make life easier for many home and small business uses.

Timeworks, Inc., 444 Lake Cook Road, Deerfield, IL 60015 (phone: 312-291-9200).

—Annette Hinshaw

SURVIVAL MATH

Sunburst Communications
Commodore 64
Disk; keyboard

Video arcade games v. educational software, that is the question. Ask parents who've forked over hard-earned money to ensure computer literacy for their children and you'll find a nearly unanimous vote for serious programs.



Survival Math: ***short on eye appeal.***
READER SERVICE NO. 257

Then ask the kids. The flip side of this coin is that frankly, they'd rather play *PacMan* or *Moon Shuttle.* And I'm *not* being flip when I say that I'm beginning to understand why. Many videogames are graphic delights, with fast-paced action backed by unusual sound effects. They're fun, darnit!

True, some games are also downright idiotic. But in many the programmers have used imagination, art, energy, and strategy to ensure that their fantasy program becomes a hot-selling sought-out game. Oh, how I wish they would share the secrets of their success with the educational programmers of the world!

Take *Survival Math* by Sunburst Communications. Here's a program designed to motivate students in grades 7-12 to become actively involved in developing their skills in mathematical computation. It comes with a bright orange handbook that's articulately written. The program has four games: Travel Agent Contest, Smart Shopper Marathon, Hot Dog Stand and Foreman's Assistant. At first glance I was impressed, and having worked the entire program I'm still impressed. But...

Basically, *Survival Math* is math workbook transposed to a monitor. Instead of flipping the pages, you press C to continue. Instead of using a #2 lead pencil to record your answers, you use the keyboard. C'mon, guys! With all the inner resources of a computer, couldn't you have used some graphics, music, fantasy, something, ANYTHING to make this a bit more enticing to teenagers? Young kids light up when they see almost any program on a monitor, but for junior high and senior high school students who've worked their way through math



Hot Dog Stand, ***another of the four games that make up*** **Survival Math.**

workbook after math workbook, *Survival Math* is just more of the same old thing.

In Travel Agent Contest you start with a budget from which you must plan a trip to Lake Geneva. You have to estimate costs for transportation (by bus, train, and airplane), meals while traveling to and while at Lake Geneva, lodging and special vacation events. When students enter a cost the entry is identified on the screen as too high, too low, or correct. The "game aspect" of Travel Agent Contest is that a student competes against another for high scores. It's not an easy game, and yet its value as an educational tool is undeniable.

In Smart Shopper Marathon students are timed as they use different estimation skills to select the best purchases in a supermarket. With the clock ticking away, they must complete each of the 5 aisles, scoring points for each correct answer and receiving penalties for each incorrect answer. In aisle one the problems involve price units. Here's an example:

1. pay .60 for 2 bars of soap
2. pay $1.10 for 3 bars of soap

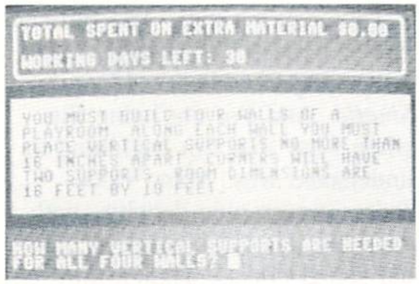
Which line has a lower unit price?

Aisle two focuses on greater total weight (i.e., five 6 oz. jars of jelly or three 7 oz. cans of tuna); aisle three requires the student to determine dollar savings on sale

items vis-a-vis the regular price; aisle four specializes in percent savings; and in aisle five the student must correctly estimate lower total price for several different items. Having completed this program I became a smart-shopping demon at my local supermarket, but my 14 year old daughter found it to be just "more math, Mom."

Hot Dog Stand is fun! Here the student learns to plan expenses involved in running a refreshment stand during the football season. He starts with a budget of $200 and his objective is to have made $2500 by the end of eight football games. There are several givens that make this game a real challenge. The football stands only hold 1000 fans. The hot dogs cannot be sold without buns, and those not sold each week are lost. One has to take into account weather conditions and time of day (evening and afternoon games). These variables make Hot Dog Stand a real test, but a fun one for the kids. And understandably, they seem to grasp the concept of hot dogs, chips, and soda more readily than trips to Lake Geneva or 7 oz. of tuna v. 5 oz. of sugar!

Foreman's Assistant is the most difficult game in *Survival Math.* Students must be able to convert units of measure, work with area and perimeter, and construct a room from the information provided. Playing the role of a construction foreman's assistant, they estimate the amount of material needed to finish six different tasks. The jobs must be completed within 30 working days, without spending more than $50 for materials not used. They have to assess their needs for wall supports, panelling, bricks, paint, bookshelves, and floor tiles. This program requires excellent computa-



Foreman's Assistant, the most difficult of* Survival Math*'s four games.

tion skills and a lot of patience. (Frankly, I'd rather hire a contractor!)

In *Survival Math,* what you see is what you get: nuts and bolts math. I cannot argue with the value of straight math programs. I do question, however, whether a typical teenager, if there is such a creature, will leap to the computer to use this program unless directed to by his teacher for remedial math work, or if his Mom threatens to cut off his allowance.

Sunburst Communications, Inc., 39 Washington Avenue, Pleasantville, NY 10570 (phone: 213-747-5261).

—Valerie B. Tamis

REFERENCE CARD
Nanos Systems Corporation
Commodore 64 or VIC 20
$5.95

If you do any programming with the Commodore character set, this reference card for the computer of your choice will be as handy as a pocket on a shirt. Each is a piece of cardboard printed on both sides and folded, accordion fashion, into pages 3.5 x 8.5 inches. The VIC card has 18 pages and the C-64 card 22, counting front and back. They are comfortable to use, and sturdy enough for hard use.

Each page is packed with information. The character set tables occupy nine pages and are identical on both cards. One table displays each character from the character set and relates all the possible ways to produce it. The maximum number of ways for any single character is eight, four each for graphic (upper case) and text (lower case) modes. In each mode, the computer may use a combination of keys, two different CHR$ codes, and a screen code which may be POKEd to a screen location.

The second table is in numerical order by CBM ASCII codes. It gives similar information, but also gives the codes in decimal and hex, and has a column for true ASCII or CBM token.

The programmer's manuals for these two machines give this information, but not as clearly or conveniently. The layout is so packed that the card is a little confusing at first, but once you understand what the table includes, it is easy to use.

The two cards share several other tables: a resume of BASIC statements, graphic symbols associated with special keys, I/O device codes, OPEN statement command codes, and a hex/decimal conversion chart. Error messages, a table of true ASCII, and a list of special characters and math operators are also the same for both machines.

Each machine has a table which shows the memory locations of its screen positions in decimal and hex, and the color registers associated with each screen location. The cards don't have room for a memory map, but each summarizes the memory positions most commonly needed by a programmer. The color codes and a table of musical notes appropriate to each of the machines complete the information common to both cards.

The four extra pages on the C-64 card are devoted to informa-

tion for programming sprites and to the more elaborate musical system available to that model. The memory locations and/or values for bit-mapping each of the sprite characteristics are delineated in separate tables. This card won't teach you to program sprites, but once you know how, it gives you all the values you need to plug into your programs.

Some of the tables seem unnecessary for the user who is advanced enough to use the card at all. On the other hand, few programmers need a table of derived trig functions. The cards would be easier to understand if an instruction sheet were included, giving a little fuller explanation of the information. Citations to pages of the reference manuals would enhance the value of the cards.

These reference cards are a useful programmer's aid. They are easier to use for quick reference than the reference manuals, and they manage to squeeze an amazing amount of information into a small space. Beginners can use them profitably, and experienced programmers will wish they had been available sooner.

Nanos Systems Corporation, P.O. Box 24344, Speedway, IN 46224. *—Annette Hinshaw*

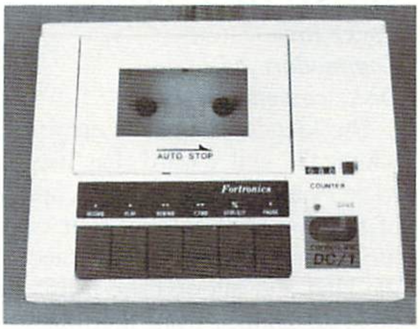
DATA CASSETTE RECORDER/PLAYER

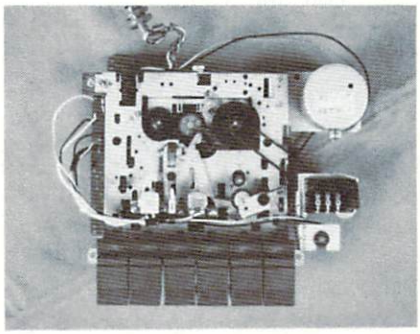
Cardco, Inc.

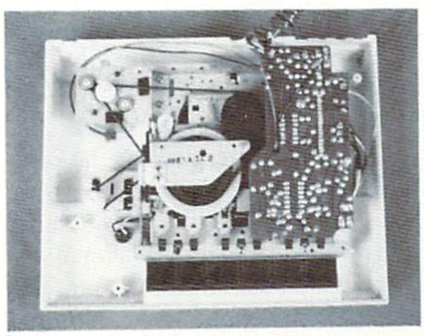
Commodore 64, VIC 20

All men (and women) may be created equal, but all cassette players are not—at least not when they're used with a C-64 or a VIC 20. Try to hook up your trusty old $29.95 handheld tape player and you'll quickly find that things just don't fit. Up 'til now, you've had two choices. Buy a Commodore Datassette or a special interface for your old player. (I have seen interfaces made by both Cardco and by Integrated Controls.)

Now, Cardco offers you a third alternative. For $10 less than the price of a Datassette, you can buy the new Cardco cassette unit. It is actually manufactured by Fortronics; you've seen that company's name on other electronic equip-







From top: 1) Cardco Data Cassette Unit; 2) erase & record heads, counter, pinch roller; 3) assembly bottom.
READER SERVICE NO. 258

ment like telephones and clock radios. The Cardco cassette unit works just like a Datassette, so no matter whether you are buying your first player or replacing a broken one, you'll never be aware of the difference.

Although this player loads all Commodore tapes and responds to all of the C-64's commands (Open, Close, Save, Load, etc.), it is physically different from a Datassette. Other than the fact that it's wider than it is deep, the first thing I noticed was the pause button. I have to admit I was stumped. Surely you'd never pause in the middle of saving or loading a program. (But I tried, and, sure enough, it creates an error.)

You can, however, pause between programs on the tape. This does release the pinch roller so, if the player sits for a long time, the tape will not be permanently indented (a common cause of cassette loading problems). If you have to reach over and punch a button, why not just hit "stop"?

The second thing I noticed was the "save" light just below the counter. Now this could be useful. Ever press the "record" and "play" buttons at the same time but not press record hard enough? Or get into a long session of copying program tapes and forget whether you're saving or loading?

The only other external difference is the plug to the computer, which is missing Commodore's ground strap. Did you ever figure out what to do with yours? The cord itself is over 4½ feet long so you'll have no trouble keeping it at least two feet from your TV. Inside the unit, each wire in the cord runs through its own ferrite to reduce interference. Four "feet" are molded into the bottom of the case; no rubber inserts are used so the recorder may slide when you punch a button.

I tried loading every tape I could find or borrow. The Cardco unit, unfortunately, had trouble with the same tapes that were a problem for Datassettes. With the exceptions of those few bad pro-

gram tapes, the Cardco cassette functioned perfectly.

If you consider this as a replacement unit to a broken Datassette, beware the tape counter. It is not calibrated the same as a Datassette's; programs registered up to 25 percent shorter. So if all your tapes are fastidiously labeled with program names and tape counter numbers, you'll have to change some labels. Of course, the tape counters on two Datassettes are not always identical either.

The eight page instruction manual tells you which buttons do what, but it totally ignores any description of tape files. Even Commodore's Datassette manual goes over the basics of files. Although the information you need is contained in the *C-64 User's Guide*, many cassette owners are computer novices and would benefit from having information on tape handling where it's easy to find—in the cassette instruction manual.

I also wish that cassette manuals would give some of the elementary rules on avoiding problems. The Cardco manual reminds you to clean and demagnetize the tape heads periodically, to rewind tapes so they are protected, to avoid magnetic fields, and to keep the player away from your TV. It does not warn you about leaving the "play" button depressed or about the hazards of slack in the tape. (Twist one hub or the other until the tape is taut; otherwise you may end up with several feet of tape running loose through the player.) Nor does it describe how to save part of a program on bad tape by pushing "stop" just before the bad spot.

Cardco's cassette unit functions identically to a Datassette and is a less expensive alternative to the Commodore player. It is lighter (more plastic) but appears to be a well-built, solid unit, and will handle tapes up to 120 minutes in length.

Cardco, Inc., 300 S. Topeka, Wichita, KS 67202 (phone: 316-267-6525).

—Richard Herring

SWORD OF FARGOAL

Epyx, Inc.
Commodore 64
Disk, cassette; $30.00

The kingdom depends on you. Ulma, the evil wizard, has used trickery and magic to gain control of the *Sword of Fargoal*. For centuries, that Sword has protected the land and allowed the people to prosper. Hidden deep in Ulma's dungeon, the Sword and its powers are useless.

Rumors about the location of the Sword abound. You have questioned many wayfarers and thieves. Of what you have learned you believe little. You do know that the dungeon is nearly vertical: cut into the depths of the mountain. Its twenty levels each consist of a few rooms, winding passages, and scattered stairways. Somewhere, below the fourteenth level, the *Sword of Fargoal* is hidden.

Getting to the lower levels, however, will be no easy task. Ulma not only has boobytraps in the floor and ceiling, but he also has his evil minions scattered throughout the dungeon—not as guards, but as murderers of anyone who might be so foolhardy as to try to rescue the Sword.

No great warrior yourself, you begin your quest knowing that you must learn from every battle, and honor the gods as often as possible. On nearly every level, you will find a small temple where you can make sacrifices to the gods, hide from evil warriors and monsters, and heal your wounds. Throughout the dungeon, you will find gold which will be your sacrifice to the gods.

In the *Sword of Fargoal* (and let me tell you that the twentieth level is certainly a "far" goal), each level is covered in a green mist which only disappears as you pass to reveal the layout of that level. This simulates making a map of the dungeon.

At the beginning of the game and between levels, two screens will flash. The first shows your experience points, battle skill, dungeon level, and monsters slain. The second shows all the spells you are carrying. Experience points control your experience level which, in turn, sets the maximum number of hit points you can have. Hit points are taken from you during battles and when you run into a trap; they are gained by resting.

Experience points are gained by sacrificing gold and slaying monsters. As you progress through the game, you will find larger stashes of gold. You will also fight tougher (and more valuable) monsters. But be careful: by level 10, some of these monsters can kill you (wipe out your hit points) with a single blow.

Exploring each level thoroughly is important; you will need the spells that are hidden throughout the dungeon. Unfortunately, there is no way to tell the difference between a spell and a trap, so if your hit points are very low, rest before you take a chance.

Spells can make you invisible, allow your hit points to increase faster, teleport you to another location on the same level, shield you from the blows of monsters during an attack, illuminate the maze around you, and let you drift gently down holes in the floor, sometimes bypassing several

Continued on page 89

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By: Michael Peltier $29.95

How to do your own maintenance, troubleshooting, schematics, theory of operation, cleaning hints, conversion from one power source to another, calibration. Step-by-step instructions will lead you through the proper methods to get your VIC-1541 up and going again in a hurry. With the information furnished, almost any operating defect can be cured. The manual contains three foldouts and over 110 illustrations including: block diagrams, schematics, waveforms, interconnect diagrams, isometric (pictorial) views, and test point locators. With all these illustrations and the detailed theory for each circuit involved, along with step-by-step procedures to follow, the manual is a great time and money saver. The Maintenance Manual is a 8 1/2 by 11 and contains 198 pages.

1541 MAINTENANCE GUIDE$9.95

By Michael Peltier

An abbreviated version of the maintenance manual. Contains calibration (including head alignment), troubleshooting for the novice and schematics and parts layout.

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CHECKBOOK ANALYZER $24.95

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Reader Service No. 271

PTE: A Personal

FOR THE C-64
by Peter Lobl

I have very large dreams. One day, I would like to write a complete computer language combining the power of PASCAL and C with the ease of BASIC. That moment hasn't arrived yet, but I have started.

This program, the *Personal Text Editor* (or *PTE*) contains an important part of my language, a screen editor. What's a screen editor, you say? Simply put, it's the method you use to enter information into the computer. The Commodore line of computers is famous for its screen editor because of its ease of use. Every time you enter a BASIC command such as RUN or PRINT, or whenever you move the blinking cursor in any direction, you are utilizing the screen editor.

My screen editor, around .8K (800 or so bytes), uses the CBM editor as a model. Though different in some ways, I feel you will find it easier than the CBM one, but that is strictly personal preference. At any rate, my screen editor comprises the heart of the *PTE,* which is compatible with all CBM, PET, and 64 computers. (Sorry, VIC users!)

WHY ANOTHER WORD PROCESSOR?

The major reason for my entry into the word processing arena is basic necessity. At high school here in Lindenhurst, New York (c'mon, you've heard of it!) the science department offers a computer course in PASCAL. It is taught on the CBM SuperPET computer, which has the ability to run five different languages. However, in my class of 20, only four SuperPET's exist, so only a maximum of eight to twelve kids could actually program in PASCAL on any given day. This was most disappointing, but not to worry, I came through.

In our room I saw 10 empty PET's and 64's gathering dust. I realized that most PASCAL programs are long and can't be typed in and RUN in one class period. Why then not use the existing PET's and 64's to enter the programs and save them for later RUN's on the SuperPET?

This idea of using the SuperPET only for RUN's and using the PET's only for editing caused elation among many, including the teacher, Mr. Woelfel. Excusing this temporary act of brown-nosing, I could see some good come from the *PTE*—now all students could program in PASCAL and hopefully learn more in preparation for the real world. I also made out like a bandit: I said the project of programming the 100% ML PTE would take months and was thus excused from six mo ths of PASCAL drudgery. The *PTE* took about a month to write and debug, and is making for a heck of an article, if I do say so myself. I hope Mr. Woelfel doesn't see it, though—the *PTE* isn't due till November!

BASIC ENTRY AND VARIATIONS

To enter the *PTE* into your 64, type in the BASIC program, including all the lines except for the REM's which are optional. The bulk of the program is data, all of which is checked by many checksums. In any case, before running the program after typing it in, SAVE it to make sure all your hard work doesn't get lost. When you finally do run the program, if any error statements come up such as

```
ERROR IN BLOCK 1
```

you know that in Block 1 of the data you have an error somewhere in the DATA statements. If all is correct a question will come up on the screen asking you to enter a file name. This file name is used to save a working copy of the final all-ML program to disk.

Notice, after doing this, that the SAVEd file is only ¼ the original BASIC program's size. This is due to the fact that the SAVEd program is all ML, whereas the original was all BASIC. This is one of many reasons to use ML, besides speed and control. Sorry to say, the program only works with disk. But all you tape users will be upgrading to disk soon anyhow, right?

One last aspect of the BASIC program concerns the capability to adapt any special printer and/or disk drive to work with the *PTE.* Included in a few data lines within Block 5 are :REM's which explain that piece of data. For example:

```
1205 DATA 80: REM #
COLUMNS ON PRINTER
```

This line would tell the computer how many columns your printer is capable of handling. If you are using anything other than a CBM 1541 disk drive, or 1525 serial type printer, you may have to change some or all of these special data statements. In reference to the previous example, if your printer could handle 132 columns, you would probably want the *PTE*

Text Editor

to recognize that fact. To do so you would change that DATA statement to read

```
1305 DATA 132 : REM # COLUMNS ON PRINTER
```

See, that's all there is to it. However, that's not the end of it. Remember that if you change a DATA value, the checksums which check for any errors will now most probably give you one. To counter this, you must change the checksums for block 5 by how much the new value differs from the old. In our case the new checksum for block 5 would be 23914 instead of the old 23862 because we added 52 to the old DATA value (132-80 columns). Do this for any changes you make in the DATA lines. The new Checksum line would now look like this:

```
350 DATA 27411, 29699, 28928, 26463, 23914, ETC.
```

instead of the previous

```
350 DATA 27411, 29699, 28928, 26463, 23862, ETC.
```

Whew! that seems like a lot of work but it really isn't.

But wait a sec, you're not done yet. You must also change the Grand Checksum in line 330 in the same way as you changed the Checksum line above. In our example (132-80 columns) the new value of the Grand Checksum would change from

```
330 DATA 429548
```

to

```
330 DATA 429600
```

Get it? I hope you do. This capability is normally only necessary if you have non-CBM compatible equipment, most likely a parallel printer. In any case, the power is there if you want. CBM equipment owners may want to employ the variable line spacing (single, double) or column setting for special effects. The key to this is experimentation. There isn't much that can go wrong.

MENU COMMANDS

To execute the *PTE* after a copy is saved to disk, type RUN and hit RETURN. This brings you to the main menu of the *PTE*, which contains eight almost self-explanatory commands. They are listed for you below with a brief description.

L—Load a text file
This loads a file saved from *PTE* or most other word processors. It allows you to enter a normal file, or one that was saved in standard ASCII.

S—Save a text file
This lets you save a text file in standard ASCII or normal CBM ASCII, with the option of adding extra linefeeds after any carriage returns.

P—Print text from workspace
This does as it says. You can dump text out as standard ASCII or normal CBM ASCII, you can add linefeeds after every RETURN, and you can format the text so no word gets cut off at the end of a line (word wrap).

M—Move text
This transfers a piece of text from one area of the workspace to another. Use this with care; you can't replace text that you accidentally overwrite.

F—Find (and Replace) a string
This lets you search the text for any character or word or phrase that may be present. If the *PTE* finds a match, you are shown where in the text this match was found. You can then change it to something else if you choose.

E—Edit workspace area
See below for description of commands in the SCREEN EDITOR.

C—Clear workspace
This erases entire workspace. Be careful!!!

Q—Quit program
This resets the computer without having to turn the power switch. Be careful here, also.

Photo: Ross Horowitz

PART III

SCREEN EDITOR COMMANDS

When inside the editing mode, you make all text insertions, deletions, and changes. The screen editor closely follows that of CBM, except for a couple of changes and enhancements. For one, the cursor, is solid, and doesn't flash annoyingly.

Here are the functions of the keys that comprise the *PTE* screen editor:

Cursor up, down, left, right: work as they do normally.

INSERT/DELETE: work as normal, except that they only work on current line being edited.

HOME: moves cursor to top left part of screen.

CLR: moves cursor to beginning of text.



"I had it programmed so that no matter what she wants, it tells her we can't afford it."

RVS-ON: inserts line in text.

RVS-OFF: deletes line from text.

RETURN: erases to end of line and leaves a RETURN marker.

SHIFT-RETURN: drops cursor down to end of line with no erase to end of line, and no RETURN marker.

SHIFT-SPACE: drops cursor to bottom of screen (anti-HOME).

CNTRL-D: deletes a character from the entire text.

CNTRL-I: inserts a space in entire text area.

CNTRL-P: tab 5 spaces right.

CNTRL-F: moves forward 1 page (25 lines).

CNTRL-B: moves back 1 page (25 lines).

Whew! These are *all* the editor commands!

INPUT/OUTPUT MARKERS

The last aspect of the *PTE* we must discuss concerns the MOVE, SAVE, LOAD, and PRINT commands. In order to use these commands correctly, you must use I/O markers. These nine markers are toggled through by using the STOP key. These markers indicate to the 64 what area of memory you want to move, save, load, or print. You can tell that a character is a marker by the fact that it appears in reverse field. Below is a description of all nine markers.

s S — These mark off where in the text buffer you want the save to occur. In other words, you put s at the beginning of the save and S at the end.

p P — These mark off which area of the text buffer you want to print out.

L — This marker tells the *PTE* where you want the text file from disk to be loaded. If, for instance, you want a file put at the end of one in memory, you would place the L at the end if the text that is already in the buffer.

m M — These markers should be placed around any area of text that you want MOVEd to another place in memory. The text in between the m and M will be moved to the spot at the T.

T — This marker shows the *PTE* where the MOVEd text will go. See the m markers for more detail.

OVERALL

All in all, I think you will be pleased with the performance of the *PTE.* Since it can be used with any CBM, PET, or 64, it allows versatility for those who need it. Even if you're used to a fancy full-blown $100 job, I think the *PTE* will convert you over, as it is so much simpler and faster.

Please write in to tell us how you like the *PTE* or send ideas on what you would want to see in an enhanced word processor beyond the *PTE.* In any case, I hope you enjoy this one. It sure has been fun for me. Now type the next great American novel, using *PTE* of course. And don't forget to give me some credit and maybe a share in the profits. □

SEE PROGRAM ON PAGE 70

LOOKING INTO TWO-DIMENSIONAL ARRAYS

ADDING A DIMENSIONAL

BY DALE RUPERT

Several months ago we investigated subscripted variables and one-dimensional arrays. This month we will add a dimension and discuss two-dimensional arrays.

We reserve space in memory for subscripted variables by using the DIM statement. For example,

```
10 DIM A%(2),B(2,3),C$(4,2)
```

tells the computer to leave room for a one-dimensional numerical (integer) array called A%, a two-dimensional numerical (floating point) array named B, and a two-dimensional string array called C$. Later in the program we must specify the values of these variables. Right now all elements of the numerical arrays equal zero, and the elements of the string array equal the null string ("").

We may use a FOR-NEXT loop to assign values to the elements of these arrays. For example,

```
20 FOR N=0 TO 2 : A%(N) = 5*N : N
EXT N
```

gives the values 0, 5, and 10 to the elements of A%( ). Thus A%(0) equals 0, A%(1) equals 5, and A%(2) equals 10. The variable name A% refers to the whole group of numbers. Each specific member (or element) of the group is identified by its numerical subscript.

Two dimensional arrays are slightly more complicated. We may picture B( ) as a rectangular group of numbers four units across and three units down:

B(0,0)	B(0,1)	B(0,2)	B(0,3)	← ROW 0
B(1,0)	B(1,1)	B(1,2)	B(1,3)	← ROW 1
B(2,0)	B(2,1)	B(2,2)	B(2,3)	← ROW 2

It is common to consider the first subscript as the row number and the second subscript as the column number. Therefore the element in row 1, column 2 is B(1,2). We could assign the value 7 to all elements of row 0 with this FOR-NEXT loop:

```
30 FOR C=0 TO 3 : B(0,C) = 7 : NE
XT C
```

Notice that we varied the column number from 0 to 3 while we kept the row number equal to zero.

If instead we want to assign a value of 8 to each element in column 2, we could do it this way:

```
40 FOR R=0 TO 2 : B(R,2) = 8 : N
EXT R
```

This time we varied the row number over its range in order to assign values to all elements in the specified column.

What if we want to assign the value 25 to all elements in the array? One way would be to use three sets of statements similar to line 30 above with the row value different in each one:

```
50 FOR C=0 TO 3 : B(0,C) = 25 : N
EXT C
51 FOR C=0 TO 3 : B(1,C) = 25 : N
EXT C
52 FOR C=0 TO 3 : B(2,C) = 25 : N
EXT C
```

Certainly this would work, but it is not the best way. Each line sets each of the elements of one row equal to 25. If the array had many more than three rows, this method would be tedious to program even with the Commodore's fine screen editor.

Here's a better way. Notice that the only difference between the three lines is the row number. Let's use

a variable for the row number as well, and step through its values with another FOR-NEXT loop:

```
60 FOR R=0 TO 2
61    FOR C=0 TO 3 : B(R,C) = 25 :
 NEXT C
62 NEXT R
```

We have now reduced nine statements to five, and we can easily modify these lines to handle two dimensional arrays of any size. The first time the loop in line 61 is executed, R will have the value 0, just as in line 50 above. C will take on the values 0 through 3 while R equals 0. After the loop in line 61 has been executed four times (C=0, 1, 2, and 3), line 62 will be executed. Now R is given the value 1, and the loop in line 61 will be executed four more times. Finally R will be given the value of 2, and once more line 61 is repeated with C taking on the values 0 through 3.

These statements duplicate the actions of lines 50 through 52 above. If this is all new to you, then probably lines 60 through 62 are a little more difficult to understand, but you should convince yourself that both sets of instructions perform identical operations.

Notice that line 61 is a loop within a loop. The entire inner loop is always completed before the variable in the outer loop is incremented. Then the inner loop is again executed in its entirety.

To analyze statements such as lines 60 through 62 above, look first at the inner loop to see that the elements in all columns of a given row are assigned values before the row value is changed. Lines 60 through 62 start at the top left corner of the array and fill it from left to right. Contrast that with lines 70 through 72:

```
70 FOR C=0 TO 3
71    FOR R=0 TO 2 : B(R,C) = N :
N=N+1 : NEXT R
72 NEXT C
```

In this example, the array is filled starting at the upper left corner, but it is filled column by column. Notice that the inner loop steps the first subscript through each of its values (0,1,2) before the second subscript is incremented.

Now to test your understanding, can you figure out the values of B(2,0) and B(1,3) after lines 70 through 72 are executed? Assume that N is 0 when the program reaches line 70.

The safest way to figure out such a problem is to "play computer." Use paper and pencil to record the values of all variables. Start at the upper left corner of the 3 by 4 array shown above and fill in the values just as the computer does. First of all, B(0,0) [pronounced "B sub zero zero"] is given the value 0. Then N is incremented to one. The NEXT R statement increments R to one. So B(1,0) equals 1. N becomes 2 and R becomes 2, so B(2,0) equals 2. N is then set to 3.

Now that the R loop is finished, C is incremented to one in line 72, and execution continues at line 71. The R loop is started again with R equal to 0, and B(0,1) equals 3. Continuing this process, you will find that B(1,3) equals 10, and B(2,3) equals 11. Your worksheet should look something like this, where the numbers were recorded from left to right:

```
R=0 1 2 0 1 2 0 1 2 0  1  2
C=0 0 0 1 1 1 2 2 2 3  3  3
N=0 1 2 3 4 5 6 7 8 9 10 11
```

If you are comfortable with the concept of nested FOR-NEXT loops (loops within loops) to fill arrays, the worst part is over. Just remember that the variable in the inner loop changes the most frequently.

DISPLAY ARRAYS

We may use the same methods for displaying the contents of an array that we used to fill arrays. Look at the program in Listing 1 on page 79.

Line 10 clears the screen. Line 20 sets the number of rows and columns of the array to 5 and 8 (ignoring 0's). The array is DIMensioned in line 30. The subroutine at line 500 fills the array with the letters of the alphabet and other symbols. The initial value of L is 65, and CHR$(65) is the letter "A".

Can you figure out whether this array is filled from left to right or from top to bottom? Since the inner loop corresponds to the second subscript (column), all columns of a given row are filled before the row is incremented. The subroutine at line 600 prints the array on the screen the same way that it was filled. Notice that line 640 brings the cursor down to the next screen line after each row has been printed.

Once the data is stored in the array, we may use or display the data any way we want. To turn the array on its side, add the statements from Listing 2 (see page 79) to the program in Listing 1.

The subroutine at line 800 has merely exchanged the positions of the row and the column variables, so that now all elements of the first column are printed across the screen side by side. Line 840 brings the

cursor to the next line, and the next column is printed horizontally. You might add these lines to slow the printout so you can actually see what's happening:

```
625 FOR P=1 TO 100 : NEXT P
825 FOR P=1 TO 100 : NEXT P
```

SEARCHING FOR LETTERS

The program in Listing 3 (see page 80) is a fairly simple example of how string arrays may be used. A ten by ten string array is defined and randomly filled with letters of the alphabet. The program prints the array and asks the user to enter a search letter. All occurrences of the search letter within the array are printed in reverse video.

This program is written in a modular form. Most of the modules are general purpose so that we can use them in later examples. The main or executive portion of the program is in lines 10 through 90. There the array is DIMensioned and the appropriate subroutines (modules) are called.

The advantages of organizing the program this way include clarity and functionality. If we don't like the way a particular module works, we may replace it with another one. If we write other programs requiring similar functions, we may simply "lift" the modules and use them elsewhere. It is like creating a program from building blocks. For lengthy programs, this modular approach greatly simplifies the debugging process as well.

The subroutine at line 300 requests the user to choose a search letter. Since the GET statement is used, the user does not have to press the RETURN key. Line 340 disregards the RETURN key (CHR$(13)) if it is pressed. Line 310 prints the prompt and erases the previous letter that was selected. You might remove line 320 to see the difference the DELETE (CHR$(20)) makes.

The GET statement does not echo the letter to the screen so line 350 is necessary. Since there is some hesitation of the computer before anything happens, it is desirable to give the user some immediate feedback that the entered value was actually received and that no RETURN is necessary. That is the purpose of the sound routine at line 2100. It causes a reassuring beep when any key is pressed.

Try removing line 360 and see the difference that the sound makes. The difference is subtle but it can be important, especially for the person using the program for the first time. The subroutine at line 2000 initializes the sound circuitry and only has to be executed once. The actual sound generation occurs at line 2100. Line 2110 pauses the program, and line 2120 turns the sound back off. The characteristics of the sound are defined in the initialization routine beginning at line 2000.

The routine at line 900 in Listing 3 randomly picks letters for the array A$. The value of 26*RND(0) is always greater than or equal to 0 and less than 26. Consequently line 920 picks a character with a value from 65 ("A") to 90 ("Z") for each element of A$.

Starting at line 1000, the cursor is moved letter by letter through the array on the screen. If the letter at the cursor does not equal the search letter L$, line 1050 just reprints the original letter. If the letter at the cursor matches the search letter, line 1040 is executed which performs the <RVS ON> function. Then the letter is printed in reverse video. Next the <RVS OFF> function is performed in line 1050 regardless of whether it was on or not.

You might add a GOSUB 2100 at the end of line 1040 if you want the computer to beep whenever it finds a match. You might also change the size of the array by redefining the number of rows (NR) and the number of columns (NC) in line 20 of the program.

SEARCHING FOR WORDS

It is a natural step to expand this program to search for words within the array of random letters. The program lines in Listing 4 (see page 80) are to be added to Listing 3 to perform that function.

The user now enters a search word W$ as requested by the subroutine at line 400. Line 130 from Listing 3 sends the program to the "find a letter" routine at line 1000. We must modify that routine slightly by adding lines 1031, 1032, and 1033 as shown in Listing 4.

The algorithm we are using is simply to scan through the array for the first letter of the search word. Whenever a match with the first letter is found, the "find a word" routine at line 1100 is called to determine if the other letters of the word are adjacent to it.

FLG is a variable which is initially zero but is changed to one if the search word is found. If the search word is only one letter long, then line 1105 sets the FLG to one and returns, since that letter is currently at the cursor.

The main portion of the word search routine is in lines 1110 through 1200. The variable D stands for direction. From the current letter in the array, there are eight directions to look for the rest of the search word: up, diagonally up and to the right, right, down and right, down, down and left, left, and diagonally up and left. These directions are assigned numbers one through eight respectively.

The search row (SR) and search column (SC) are given the current cursor values in line 1115. The letter which is directly above the cursor position has a row value one less than the current row and a column value equal to the current column. The subroutine at line 1310 defines the increments RI and CI accordingly.

The inner loop starting at line 1130 steps through the search word letter by letter. The new row and column values in the given direction are defined by line 1140. Line 1150 checks to make sure that we are still within the array. If not, a new direction of search is chosen at line 1190. Line 1160 determines whether or not the letter at the search row and column equals the next letter of the search word. This is repeated for all letters of the search word until a mismatch is found, at which time line 1190 is executed again to change the direction of search.

If all letters of the search word are found in the chosen direction, the inner (J) loop is terminated properly at line 1170. Line 1180 sets the FLG to one indicating a successful search, and the search continues in the next direction. Once all directions have been checked, control returns to line 1032.

If line 1032 sees that the flag is set (FLG=1), line 1033 sounds two beeps. Lines 1040 and 1050 print the first letter of the search word in reverse video. The search continues throughout the rest of the array for a match with the first letter of the search word.

REPEATED SEARCHES

We have all the routines now to turn the computer loose and let it repeatedly search through random arrays for a chosen search word. This shows how easy it is to modify a program written in a modular format. The lines in Listing 5 (see page 81) are to be added to Listing 3 and Listing 4. Line 41 skips past the previous executive routine in lines 45 through 140 and brings us to a new main loop at line 2200. The sequence of steps in lines 2200 through 2250 should be easy to follow. The purpose of the program is to ask the user for a search word and to continuously create and search random arrays of letters for the search word. The program keeps a count of the number of searches and the number of times the search word is found.

We must modify the "find a word" routine slightly by adding line 1185. This increments the count variable CT every time the search is successful. A cumulative total of successes is kept in NF at line 2260. The total number of searches (NS) is updated at line 2270. The data is displayed on the screen, and execution continues at line 2220 where a new random array is created.

Perhaps the statisticians among you can determine the probability of a selected word being found within a random array of letters. While you are working on that problem, let your computer perform the experiment. Then see how the theoretical solution compares with the experimental value. Specifically the problem is this: What is the probability that an n-letter word will be found in a random m by m array of letters in any one or more of the eight directions defined earlier? It turns out to be a very interesting (and challenging) problem. Let me know if you find the solution.

The programs we have created here are not the standard word search problems found in various puzzle magazines. We have most of the routines available, though, to create such a program. In addition to randomly filling an array, you will have to insert hidden words in various directions throughout the array. Inserting them should not be much different from searching for them, however. Rather than randomly filling the array, you may prefer to type the letters of a word search puzzle into the array. Then the computer could solve the puzzle for you.

Replace the "randomly fill array" routine at line 900 with your own routine. You might put the characters into DATA statements and use a READ statement instead of the random character generator at line 920.

FINAL PROBLEM

Here's one more challenge for those of you that like to PEEK and POKE at the innards of BASIC. Once an array has been defined, you may look at the way it is stored in memory. The pointer ARYTAB at decimal locations 47 and 48 shows the start of array storage, as defined in the *Commodore 64 Programmer's Reference Guide.* The pointer STREND at 49 and 50 shows a value one greater than the end of array storage.

As suggested in the May installment of the *Rupert Report,* you can run the program labeled Listing 6 (see page 81) with arrays of two (or more) dimensions to see how they are stored.

A few clues to get you started: the first numbers displayed are 193, 177, 33, 0, 2, 0, 3, 0, 4. The array name A1 is represented by the first two numbers (hint: subtract 128 from each). The 33 just tells the total number of bytes used by the array (count them on your screen). The 0 and 2 indicate that this is a two-dimensional array. The 0,3 and 0,4 show the numbers of elements in each dimension, columns

Continued on page 64

Tunnel of Tomachon

For the Unexpanded VIC 20

As you steer your craft into the forbidding blackness of the fabled Tunnel of Tomachon, you do so knowing that you are undertaking a mission which you have no hope of surviving—a mission which you have no hope of successfully completing—but a mission of inestimable importance to civilized humanity.

The massive planet Tomachon is the oldest charted by astronomers—so old that stars have risen and died during its lifetime. Ages ago, the Tomachonians tired of their position as counsel to the millions of civilizations that sought them out from all corners of the universe, and decided to retreat to an existence of private contemplation.

Their technology made it simple to bore a path to the center of their world. For another civilization to follow would not be as easy. The jagged pattern in which the tunnel was dug made it impossible for any but the most skilled pilot to navigate without quickly crashing. In addition, the Tomachonians left behind beings of chemical origin which have multiplied through the ages and now guard the tunnel from intruders. As a final obstacle, deadly photon barriers were erected at intervals.

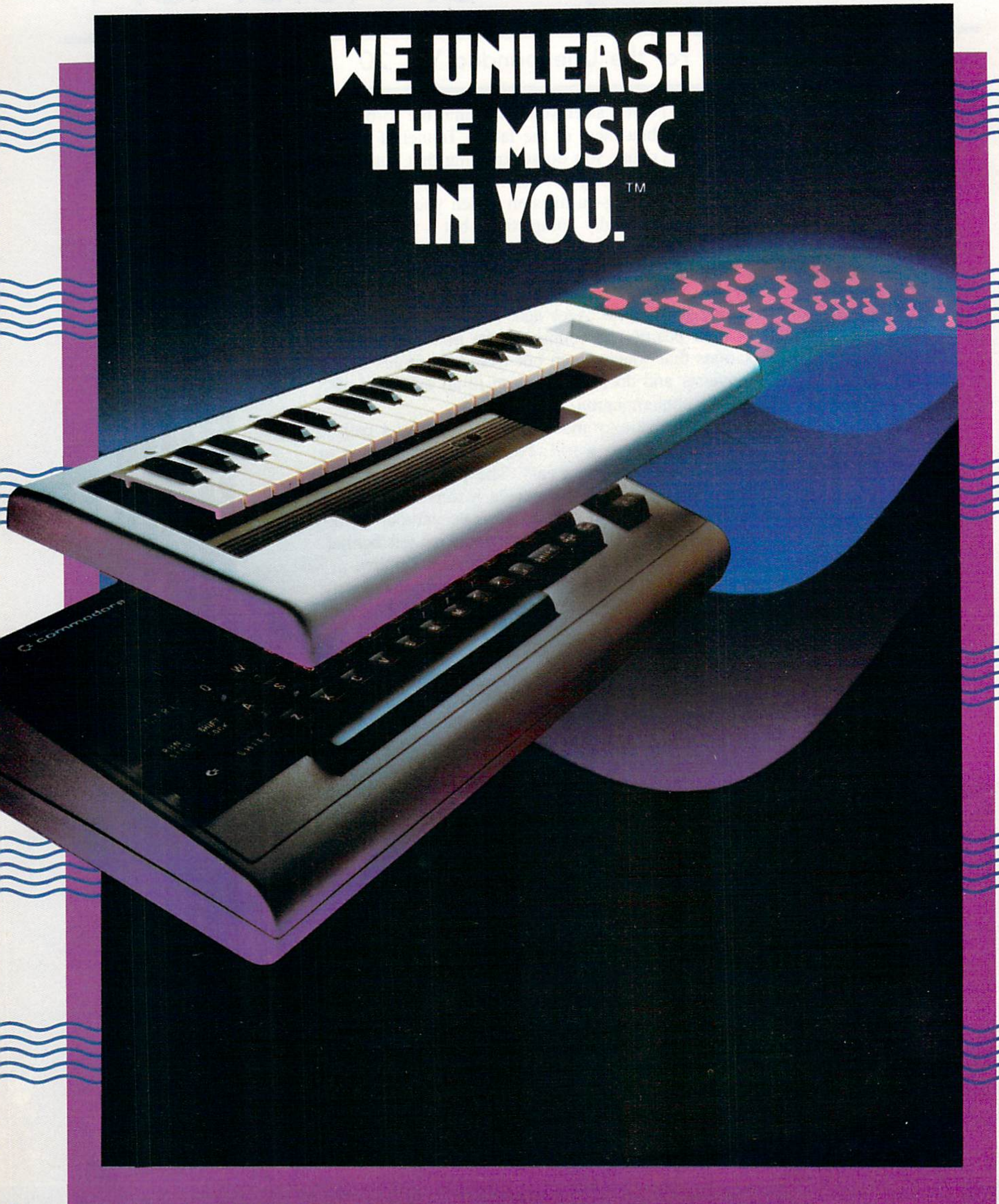
Even without these impediments, the voyage to the center of the unimaginably large planet is too long to be completed within a single human lifespan. Your objective is to penetrate as deep as possible and hope that future generations, born aboard your ship, can someday reach the tunnel's end—and, if they find the Tomachonians in a talkative mood after all these years, uncover the secrets of the origins of the universe.

This program must be entered and loaded in two parts. Type in and save part one, then do the same with part two. To play, load part one and run it. When the word "NOW" flashes, hit the run/stop-restore sequence to reset the machine. Now type NEW. After this is done load in part two and run it.

(By the way—don't be needlessly tantalized. We mean it when we say that you will never reach the end of the Tunnel of Tomachon. It isn't in the realm of possibility—or in the program.) □

SEE PROGRAM LISTING ON PAGE 85

By Stephen Schuster


WE UNLEASH
THE MUSIC
IN YOU.™

The INCREDIBLE MUSICAL KEYBOARD™

transforms your computer into an exciting musical instrument.



The Incredible Musical Keyboard can do more than turn your Commodore into a music synthesizer.

Deep within every Commodore 64 lurks the unexpected. A versatile music synthesizer. A music video machine. A three track recorder. And a way to create music that's so easy you'll be playing songs within minutes.

Just place the Incredible Musical Keyboard over the computer keyboard, load the included music software diskette, and you have all you need to make piano, guitar, synthesizer and electronic sounds.

Everything you need to create music is included . . . whether you're a beginner or an accomplished musician.

If you can press a few keys, you have all the skills it takes to create and play music with the Incredible Musical Keyboard.

Just beginning? Attach the included ABC key stickers to the keys and match the letter in the note with the letter on the key and . . . PRESTO! . . . you're playing music instantly. It's easy. It's fun. It unleashes the music in you . . . even if you don't read music.

You already read music? Great! We've included a Melody Chord Songbook featuring hits from today's top recording artists. Or play songs from your own sheet music.

The Incredible Musical Keyboard works with other exciting Sight & Sound Music Software programs, too!

Get the **KAWASAKI SYNTHESIZER** and transform your Commodore 64 into a sophisticated music synthesizer and sound processor. With one keystroke, you can control waveforms, vibrato, sweep and other special effects. Let your imagination soar with the **KAWASAKI RHYTHM ROCKER** creating and recording your own songs while you control eye-popping color graphics that explode across the screen. Create your own music with the **MUSIC PROCESSOR**, a word processor for music. Then record it, edit it and play it back. Use the 99 preset instrument and special effects sounds for endless new creations. Or travel through a complete tutorial on music synthesis with the newest Sight & Sound music program, **3001 SOUND ODYSSEY**. After you've learned the basics of music synthesis, you can use the complex music synthesizer included in the program to compose your own music, create your own sound effects or simply experiment with the hundreds of pre-programmed sounds.

From the Incredible Musical keyboard to software that plays your favorite hits, we've got them all.

Look for the Incredible Musical Keyboard and the complete line of Sight & Sound music software at your local computer software outlets and music stores. And unleash the music in you.



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SIGHT & SOUND Music Software, Inc.

WE UNLEASH THE MUSIC IN YOU.™

Reader Service No. 268

Play It Again SID...

Continued from page 21

page through screens of options that allow you to change the ADSR, filter, waveform, and ring modulation. You must go through all the questions for each voice you wish to change. Tedious, but acceptable.

There is one advantage to using such a program, though. Its companion program *NotePro Bridge* will allow you to take the songs you've created and use them in your own programs. The modules you create with the *Bridge* are yours and can be freely marketed.

SOUND SHAPER

Sound Shaper falls into the same category, but it is more clearly defined. It is intended to be used *only* to create sound to go into another program. It has all of the standard adjustments: ADSR, waveform, ring and sync, filters, and cutoff frequencies. But it plays one note and only one note at a time. By using the + and − keys, the pitch of the note can be raised or lowered.

The one thing this program does that no other in our group can is write POKE statements. Others write DATA statements, some create whole song files, but this one will write POKE statements and send them to a printer. There are complete instructions on how to use these in your programs.

An inexpensive way to get started putting sound into your programs.

THREE MORE

Entech is also marketing a program called *Add Mus'in* which makes it possible to take tunes created with *Studio 64* and put them into programs.

Master Composer and *Ultisynth* also have sections in their documentation detailing how to use their music files in your programs. They're the only full-featured music processors in our survey that don't need an interpreter to get their music into your BASIC programs.

We'll discuss *Studio 64, Master Composer,* and *Ultisynth* completely in the section on programs with professional features.

VOICE BOX

The Alien Group has an interesting package that doesn't really fall into any particular category. Sold with a plug-in module that lets the Commodore talk, their music system and animated face program is effective. It has all the standard synthesizer parameters, plus vocal editing and face changing options. With these it's possible to create a face that sings along with the music.

The documentation leaves something to be desired. The ugly little booklet looks like the cheap programs my high school contemporaries used to print up for assemblies in the gym. There is enough information to get nice sound music out of the Commodore, though. The sample songs are all tunes that any American would recognize.

The sound quality of the voice module is at least equal to that of the Votrax units available for other computers. But like other vocalizers, a special phonetic spelling is needed to really get the words to sound right. A companion program is available that lets the user create special dictionaries. Other programs can then look up the word in the dictionary and use the pronunciation found there.

It sould be noted that the program will create music without the Voice Box module and is offered as a separate item.

WHAT'S LEFT?

The remaining programs have professional possibilities for creating songs. To some extent, they could be used by a working musician. There are a few features that most musicians would want in a music program. Besides being able to change the characteristics of the sounds coming out and playing songs on a keyboard or entering them in note by note, most studio musicians need some way to print out their music.

When composing a song to be recorded in a studio, it would be very unusual to have only the Commodore appear on the recording. Usually, you add vocals, some live instruments, drums and guitars, maybe some strings. This requires handing a copy of the sheet music to the other musicians who are going to play.

A good copyist can create the sheet music from a cassette of the song overnight. Good copyists cost money and you can never be sure one will be available. Two of our sample programs solve this problem by printing out sheet music of the songs you create; *Music Construction Set* and MusiCalc's *Scorewriter* module. Entech is in the process of developing *Lead Sheet Writer* to interface with *Studio 64* and print music scores.

And of course, the copyright office would like to see a nice printout.

All of the remaining programs have the stan-

dard ADSR, waveforms, filters, tempo, and resonance adjustments. In this way, they are all pretty much the same. The big differences are in how the programs interact with the user and the quality of the documentation. Each uses a different method for changing parameters and levels. It's very hard to draw a line at the point where difficulty of use is no longer justified by the flexibility of the features. And it is all relative, depending on how bad you want a particular feature. Since we can't make that kind of decision for you, we'll stick to just telling you what's there.

STUDIO 64

As mentioned earlier, *Studio 64* has two entry modes. You can compose on its modified keyboard, just as you would play an electric organ or piano, using the space bar to indicate a rest.

Or you can enter notes individually, modifying their duration. Notes of the same value are added together, so you must press the "–" key to indicate that you want a new note to start. For instance, keying two sixteenth duration C notes combines the two notes to create an eighth note C. To play two sixteenth duration C's requires pressing the note for a C, the "–" key, and another C. Rests must be entered using the space bar.

After "recording" the song, you can play it back to hear how it sounds and plan modifications. The song can be changed in either real time or one note at a time.

As noted earlier, its companion program *Add Mus'in* will allow including *Studio 64* music files in your own programs.

ULTISYNTH 64

This one may be the best kept secret of the bunch. We've seen no advertising for it, no reviews, no mention anywhere. And it's a real sleeper. (For those who aren't up on gambling terminology, it's a come-from-behind winner.) Nalin Sharma has written a flexible but highly useful music synthesizer program.

As with the others, the sound quality is easily changed, the keyboard is reprogrammed to stimulate a musical one, and it has a record and playback mode. But unlike the others, *Ultisynth* has a pretab mode that lets you construct your own waveform. This means you can get a very accurate sine wave without having to use filters to do it. In editing the pretab, you actually draw a picture of the wave you want to use. The wave is broken down into 256 parts. When a note is played it will cycle through the positions of this waveform relative to the note that's being played.

The pretab mode includes settings for the voice's exact frequency, the cutoff frequency, pulse width, and resonance. Any or all of these can be on or off. Because these are set in a file in advance, they can be used in real time playing. You need only hit two keys to activate a pretab setting.

The cute little book that is the documentation is packed with helpful information. The back even contains reference cards to note how you got a particular sound, so you can duplicate it later. They resemble the preset sequence sheets that come with many commercial synthesizers. Kind of like the recording console log sheets that are used to keep track of the filter settings and fader levels in a multitrack console. Very useful things.

MASTER COMPOSER

Master Composer has you enter songs into a musical scale with slightly nonstandard musical notation. Instead of a musical note, the sound is represented by its voice number. So you have little 1's, 2's, and 3's sprinkled on your musical scale.

Each measure is divided into parts: 2, 4, 6, 8, or 16, depending on how many notes you'll need for each measure. The idea here is that each note's duration is determined by its position in the measure and the position of the next note. It isn't a difficult system to use for those who understand music. It was actually one of the nicer entry systems.

Because *Master Composer* is based on music composition theories, you assign key signature and time signature and music is entered in either treble or bass clefs. There are ways to enter naturals, sharps, and flats as well.

You can play a single note or single measure to refresh your memory of where you are in the song, or you can play the whole thing if you wish. There are a multitude of editing commands, so you can move sections around, repeat them, or delete them.

There is also a short cut to creating songs. By creating groups of measures and identifying them as blocks, you can then use a linking feature to combine the blocks into a whole song without having to duplicate each block repeatedly. A song could consist of only a few blocks that have been linked and repeated whenever necessary. Nice feature.

Master Composer does a screen dump so that you can make a hard copy of your files. It isn't in standard notation, so you'd have a hard time handing it to a session musician and asking him to play it. It also wouldn't do you a bit of good when you try to

register the song for copyright. Sorry!

KAWASAKI PERFORMER AND COMPOSER

This program has one thing going for it that none of the others have. You can play chords in real time. In polyphonic mode, this program will simultaneously play three notes struck on the keyboard. In all the other programs, the three notes would have to be entered in record mode and then played back in order to sound together. Hurray! This allows you to play a keyboard the way most musicians do: with both hands.

This program is excellent. It has menus to get you around, cute little characters to get you interested, and marvelous demos. The demonstration songs are all original, except for the one classic which allows a comparison with something you probably already know.

The sequencer in *Composer* mode works just like the sequencer of a professional synthesizer. In most respects, the whole package resembles a keyboard instrument with alternate operating modes. One mode plays back sound already created, the other allows free creative license.

The *Performer* has some built-in features like WAH-WAH and Vibrato that are extremely easy to use. Though these effects can't be used simultaneously, it really isn't any handicap to creating some wonderful sounds. There is a menu of musical instruments from which you can choose. It is easy to change the waveform of the instrument while performing.

In *Composer* mode, you can set a whole series of instruments to play. The program creates and stores several different types of files. You can store the parameters for the instruments you create and want to reuse. You can save sequences (sections of music) for use in other songs. You can store whole songs, including all three parts of the harmony. If you come up with a bass line you really like, it can be stored as a bass file. There's even a file type for especially long compositions.

The documentation is excellent, unusually entertaining for a software manual. Definitely one of Kawasaki's better selling points.

To top it off, Sight and Sound is marketing a musical style keyboard to use with the *Kawasaki Synthesizer.*

And that leaves the two packages that do nice, standard musical notation printouts; *MusiCalc* and *Music Construction Set.*

MUSIC CONSTRUCTION SET

This program uses an unusual style of input. A musical scale appears in the top part of the screen. The bottom part has graphics representing notes, rests, time signatures, key signatures, an octave raiser, and natural, sharp, and flat notations. There is even a dot to create dotted notes with.

A group of faders at the bottom set the speed, sound quality, and volume. There is a beat counter to keep track of where you are in the measure. A group of icons, bottom right, help you choose the functions you wish to perform.

A little hand controlled by the keyboard or a joystick acts as a pointer. By using the hand to grab notes or point at icons, you tell the program what to do. You choose a key and time signature. You pick bass or treble clef. You take the notes and other graphics and put them into the scale, creating sheet music.

MCS has all the standard editing features allowing you to move measures around or delete or copy them. You can play the song through to see how it sounds, etc.

It has a limitation, though. There is no provision to directly control the waveforms, ADSR, filters, ring, sync, or any of the other parameters that most synthesizer players like to have at their fingertips.

The printout is basically a screen dump of the sheet music you've created. It prints eight measures at a time vertically. It looks strange and you'd have to cut and paste it all together to get an acceptable piece of sheet music, but it can be done. The printout looks a little cramped, but then so does the screen when you get a lot of notes on it.

MUSICALC

MusiCalc actually contains three modules, each sold separately. *MusiCalc 1* is the synthesizer and sequencer. *MusiCalc 2* is the scorewriter. And *3* is the keyboard maker.

Of the programs in our survey, *MusiCalc 1* seems the most like a commercially marketed synthesizer. Complete with presets, faders and sliders, and the sequencer, it feels much like a real synthesizer to use. There are course and fine adjustments for all the parameters.

The documentation is very complete. Laid out with a tutorial section and a reference section, we had no trouble finding our way around this program. There's even a trouble section in the back to give you some idea why things aren't turning out as you expected.

MusiCalc 2 takes the songs you've created with *1*

and prints them out on a Commodore or other printer. Although the documentation only claims to work with the Commodore 1541 printer or the Epson Mx-80 or Gemini 10 with Cardco interface, we had it working fine with a Mannesmann Talley 160-L and Cardco +G interface. No problems. In fact, we were very pleased with the printout.

We preferred the quality of the *MusiCalc* printout to that of *MCS*, because it looked better. The notes were properly rounded and the lines were solid in the *MusiCalc* printout. This wasn't true for *MCS*. As with *MCS*, though, the printout is vertical, so some cutting and pasting would be necessary to get a really acceptable piece of sheet music.

CONCLUSION

As you can see, there are many types of music programs. Not all are suitable for everyone. Generally speaking, though, the cost of the program reflects its complexity. Being more complex doesn't necessarily mean better, though. Some of the less expensive programs would work better for someone who just likes to play with sound. A professional might need the greater flexibility of the more expensive music processors. Keep in mind what you want to do with the program when you go shopping. And we hope this survey has been helpful to you. □

PLAYING THE COMMODORE 64

Continued from page 17

colors, and all—and includes sprite and character editors. You can design your own graphics or draw from the library on the disk. Among other things it includes a stage, and a number of sprite musicians who animatedly play their instruments in time with the music. The *Music Video Kit* won't be available until after Christmas.

The other Sight & Sound series which works with the Incredible Music Keyboard is more of a fantastic experimentation aid for sound and graphics coordination. Programmed by professional jazz musician Ryo Kawasaki, the *Kawasaki Synthesizer* ($49.95) contains two disks with elaborate documentation. *The Performer* allows you to sound three tones at once or play along with (but not save) several preprogrammed bass and rhythm tracks. There are a host of special keyboard effects (glissando, vibrato, slide) and over 50 preset voicings. To save your music, you must write it with *The Composer*, the second disk in this oriental-flavored package. Making music with this program is versatile and fun, although I found it more complicated to use than the other Sight & Sound software series. It includes split keyboard and sequencer features (that the other doesn't have) and full access to all SID registers. The *Kawasaki Rhythm Rocker* ($39.95) rounds out this series. The screen graphics are a kick, and commands for adding a melody over preprogrammed bass and rhythms (and saving them to disk), sound effects and colorful but limited hi-res random drawings which will scroll past with the music are included. The Kawasaki series doesn't use standard music notation, although you can enter music on the mini-keyboard.

COLORTONE PRO KEYBOARD

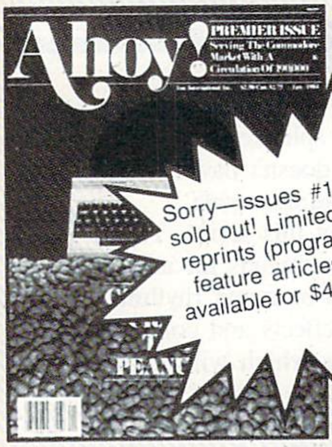
The third—and most elaborate—musical keyboard for the C-64 wasn't available for review at press time. But I played with a pre-production model of the *Colortone Pro Keyboard* ($399.95) from Waveform Corp. at the Consumer Electronics Show earlier this year in Chicago. It's a full sized, 37-key (three octave) keyboard which comes with polyphonic performance software and a synthesizer tutorial that covers the physics of sound with visual and audible examples of sound envelopes, waveforms, filtering, and other effects. It also works with Waveform's (monophonic) *MusiCalc* series of programs. Across the top of the keyboard casing are two colorful touch-sensitive strips. One is for playing glissando (and other) effects by simply running your finger across it, and the other is for prerecorded scales and musical patterns loaded in from the *MusiCalc* series. I hope to have a review of this keyboard for you soon along with Waveform's Colortone Keyboard ($79.95), a flat, little two-octave touch-sensitive keyboard with music education software.

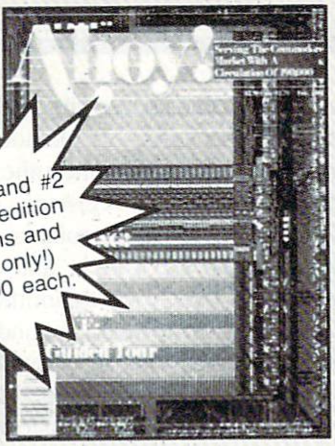
CONCLUSION

The SID chip in the Commodore 64 is a full-featured music synthesizer. Musical keyboard attachments change it from a computer to a bona fide musical instrument. Whether you're experienced with another instrument, want to learn about music from the beginning, or just have some fun with sound and graphics, keyboards allow you to get past the drudgery of programming and let your creativity sing. □

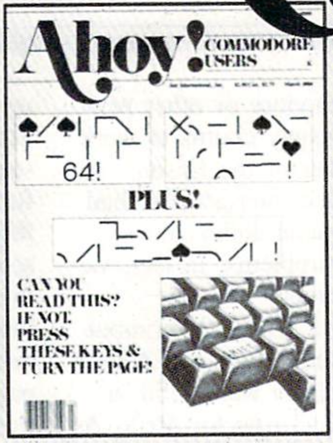
With so many 64- and VIC-compatible printers available, you may have put off your purchase of that important peripheral out of sheer bewilderment. But no more! In the December* Ahoy!*, Tom Benford will explain everything you need to know to select the printer that's right for your needs.

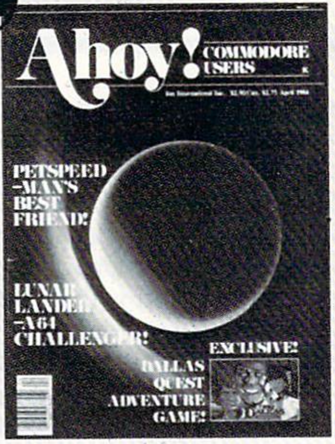
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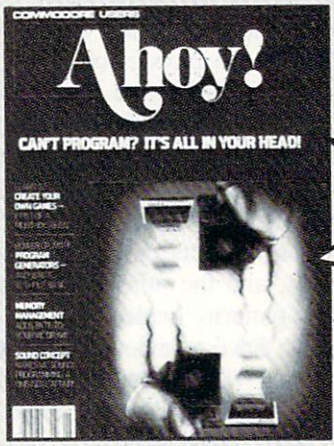
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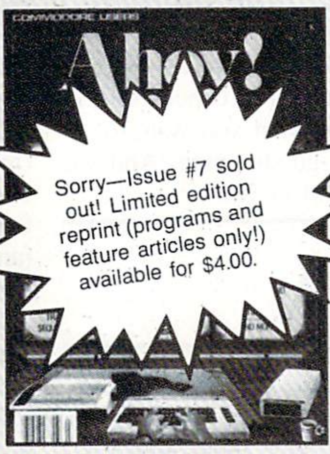
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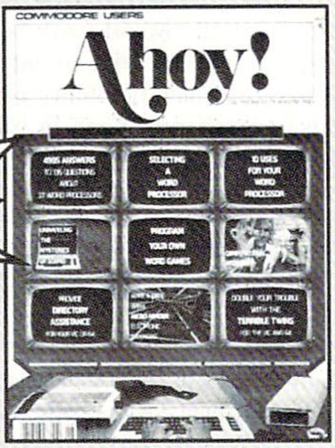
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A BLOCK EDITOR FOR THE C-64

BY DAVID BARRON AND MICHAEL KLEINERT

Previously we have written several articles concerning your disk drive. The utility program described in this article will give you direct control over the information contained on a disk.

Block Editor allows you to look at and modify any block on your disk. Operation is fairly straightforward. Following is a command summary:

(fl)=Change Byte: When selected this allows you to enter a new value for the byte under the cursor.

(f3)=Save Block: This will write the block you have been working on back to the disk. Be CAREFUL here! It is possible to destroy a disk by changing the wrong information and then writing the modified block back to disk.

(f5)=Load Block: When you wish to view another block select this option to specify which one.

(f7)=Exit Program: Select this option when done.

Additional Commands

Cursor Keys: These move the cursor around in the currently selected block.

+ and − keys: These will load in the previous or next blocks of information on the disk.

Screen Information

In the upper right hand corner of the screen you will see two numbers separated by a slash. The first of these is the current track, the second is the current sector.

Value is the current value of the byte under the cursor. Position is the position of the byte under the cursor within the selected block.

When you first run the program you will be asked for a track and sector. This will be the location of the first block to edit.

By looking through the disk you can find all sorts of wonderful bits of information. Of course, the fun of it is finding these things, so we'll leave all the fun to you. Enjoy!!

P.S. After careful thought we have decided to be kind and at least give you a starting point. Try track 18 sector 1. □

SEE PROGRAM LISTING ON PAGE 88



Alternate Character Set

FOR THE COMMODORE 64

By Morton Kevelson

This short program illustrates the fundamentals of character set manipulation for the Commodore 64. It has the added side benefit of a possible useful application as well.

INTRODUCTION

A byproduct of the research which went into the preparation of the graphics program reviews in this issue and last was an insight into the operation of the Commodore 64 character set and the VIC II chip. The brief program accompanying this article is a direct result of these efforts. It is also an attempt to alleviate a minor frustration which had gradually developed over a two-year involvement with Commodore computers.

THE TWO CHARACTER SETS

The Commodore 64 has two independent character sets. Each of these sets contains a total of 128 unique characters.

The first consists of the upper case alphabet, numbers, all the standard punctuation marks, some mathematical symbols, and a unique set of graphics characters. The latter consists of two groups which are accessed by holding down either the shift key or the Commodore logo key.

There is an alternate character set which is easily accessed by simultaneously tapping the left shift and logo keys. The result of this action switches the keyboard into lower case mode. Pressing the shift key with any of the letter keys will now generate the upper case characters. About half of the graphic symbols from the first set have been replaced by the upper case alphabet.

Actually, the two sets just described are only half of the available characters. There is a reverse image duplicate for each of these sets. This reverse image can be displayed by simultaneously pressing the CTRL and "9" keys. The normal characters are restored with the CTRL and "0" keys. Both normal and reversed characters can be freely intermixed on

James Regan



the display screen. Thus, a total of 256 characters compose each of the sets.

A careful perusal of the graphics characters in the first set shows that these have not been arbitrarily chosen. Many of these symbols have regular geometric patterns. These characters are designed to line up when printed either side by side or top to bottom. Careful selection and arrangement of these characters allows the generation of all types of chart displays for business applications.

Early on I discovered that occasionally the need arose for some of the missing graphics symbols when lower case mode was selected. It is the sort of thing which is normally not missed, except for the fact that one knows of its existence. Somehow, it seemed only right that these symbols should be accessible even in lower case mode. The accompanying program will do just that. Before I get into its operation, let us examine the operation of the Commodore 64 with its character sets.

THE SCREEN DISPLAY CODES

Appendix E on page 132 of the *Commodore 64 User's Guide* (that is the book that comes with the computer, so no excuses, please) is a table of screen display codes. This table has three columns which correspond to the two character sets and a screen POKE code. The blank spots in the center column simply mean that the character is the same as in the first column. The POKE codes are the numbers which when POKEd to screen memory will display the corresponding character. A color value will also have to be POKEd into color memory, except with some early versions of the Commodore 64.

For example, POKE 1024,1:POKE 55296,1, will display a white letter "A" in the upper left corner of the screen. The POKE code which does this has a special significance. It has to do with the way the VIC II chip works and how the original character images are stored in the computer's memory. These images are stored in a read only memory chip which is often referred to as the Character Generator ROM.

Each character is actually composed of a pattern of dots arranged in a 64 dot square (eight by eight dots). Each eight dot row of this square corresponds to a single byte of the character ROM. It takes eight bytes to store the pattern for a single character. Thus, a single character set requires 128 by 8 or 1024 bytes. Twice this amount is needed to allow for the reverse characters. Double this again and we arrive at 4 kilobytes for both of the Commodore character sets.

This is where the screen display codes come into play. They actually represent the character's storage position in the character ROM relative to the first byte. For example, the POKE code 0, for the commercial at (@) symbol, points to the first eight bytes of the ROM. The POKE code 5, for the letter "E", points to the eight-byte group starting with the 5-by-8 or the fortieth byte in the ROM (remember, we count the first byte in the ROM as byte 0).

The character ROM is located in the 4K block starting at 53248 ($D000). This is actually a very busy area in the Commodore 64. In addition to this ROM, all of the input/output hardware as well as the VIC II chip and the SID chip are located in this block. Underneath it all is a layer of RAM as well. The normal configuration lets BASIC access the I/O chips.

The location of a specific character's byte pattern (SA) can be easily calculated. Simply take the screen POKE code (PO), multiply it by eight and add it to the character memory start address (CM), normally 53248. In BASIC:

```
SA=PO*8+CM
```

The reverse character patterns start 1024 bytes further up—or simply add 128 to the POKE code. The alternate character set starts at 55296 ($D800).

There is one additional consideration. The value of a screen POKE code is limited to a number from 0 to 255. This is the range of values which can be represented by a single byte. Thus, allowing for reverse characters, we are limited to a selection of 128 characters at any given time. The VIC II chip actually treats the character ROM as two separate character sets, switching between the two as required. Since the VIC II chip updates the display screen 60 times per second, all of the screen characters will change when the character sets are swapped.

THE PROGRAM

Enough of this background material. Let us see how this program works. In brief, it will allow the simultaneous screen display of any of the Commodore graphics characters along with upper and lower case text. The penalty is a loss of the reverse text characters.

The first step is to select the bank in which the alternate character set will reside. A detailed discussion on this topic was presented in *An Overview of Bit Mapped Graphics* in the October issue of *Ahoy!* In brief, lines 1000-1700 of Program 1 select bank 3 as the active area for the VIC II chip. The alternate character set is positioned in the bottom half of the unused 4K block starting at 49152 ($C000). The screen memory is relocated to the upper half of the same block. Selection of this section of memory as the workspace does not subtract from BASIC's working memory. In fact, the original screen RAM can be added to the BASIC workspace after this program is run. The following statements will do this. (See *Memory Management* in the May and June issues of *Ahoy!* for additional details on this sort of memory manipulation.)

```
POKE 1024,0
POKE 44,4
NEW
```

The remainder of the program merges parts of the alternate character sets. The entire upper/lower case set is moved into the default position. The reverse lower case text characters are replaced by the graphics characters generated with the shift key. Program execution takes about thirty-six seconds, so be patient. When the job is done, the keyboard and screen print statements will behave somewhat differently. The default settings will display the upper/lower case character set. When the reverse field is activated, the unshifted text keys will display the shifted Commodore graphics. All other keys display the expected reverse characters.

The hardware arrangement of the Commodore 64 requires certain additional steps to allow BASIC to access the character ROM. This ROM is normally invisible to BASIC, being hidden under the input/output chips. These chips allow the computer to interact with the keyboard, disk drive, and user port. In order for BASIC to see the character ROM, the I/O section has to be switched out. This is done by line 2100. To prevent the system from crashing under this arrangement, the keyboard scan, which occurs sixty times a second, is turned off by line 1900.

One more thing has to be done to make the operation complete. It is not enough to tell just the VIC II chip where to place the characters. The operating system must be informed about the new location of the screen memory. This is done by line 3900. The value of 200 is derived by dividing the start address of the screen memory by 256.

You will notice one additional peculiarity with this operation. If the blinking cursor is moved over the displayed text characters, the shifted graphics characters will appear. This is because the blinking cursor is actually implemented by alternately displaying the reversed and normal character.

To return the system to normal, simply hit the RUN/STOP and RESTORE keys. The screen display will still be messed up until the operating system is told about the change. While ignoring the display, enter:

```
POKE 648,4
```

followed by a clear screen command. If you had changed the start of BASIC, then

```
POKE 44,8
POKE 2048,0
NEW
```

is also required.

Once the program has been RUN and as long as the computer has not been turned off, the alternate character set can be rapidly accessed. The time it takes to transfer the character patterns can be eliminated. Program 2 lists the lines which will do this. These can be simply added as a subroutine to your own application.

Program 3 adds one more bonus. It makes use of the VIC II chip's ability to access the RAM under the KERNAL ROM. The alternate character set is stored starting at 57,344 ($E000) under the operating system. The screen RAM is moved to 49152 where it can still be PEEKed and POKEd by BASIC. The result is that the DOS wedge can still be used while the alternate character set is active.

(Note: this program, and all the others in the November *Ahoy!*, can be obtained on disk. See page 66.)

SEE PROGRAM LISTING ON PAGE 78

Program Image File Structures

By Morton Kevelson

The majority of the drawing packages which we looked at for our report on graphics programs (begun last issue and concluded this issue—see page 21) are of the multicolor type. We also looked at *Picture Perfect,* a multicolor screen dump program for *Koala* format picture files. In the course of writing this report, we had occasion to generate *Picture Perfect* screen dumps from images created by the various programs. The simplest way to do this was to convert the image files to *Koala* format.

The hardest part of the conversion process was determining how the multicolor data was stored in the various files. Once we had this information, it became a simple matter to LOAD the file into memory, rearrange the data with a machine language monitor, and reSAVE the file. Alternatively, a simple BASIC program could be used to PEEK and POKE the data into the proper locations.

The following table supplies all the necessary file parameters for several of the programs. Refer to last month's article on bit mapped graphics for details on multicolor image structure.

The *Koala* file name format is a bit unusual. For a file to be recognized by the *Koala* program, it must be exactly 15 characters long. This insures that the 16th character is a shifted space (CHR$(160)). The name should be padded with spaces (CHR$(32)) to make 15 characters if required. This is not necessary with *Picture Perfect* as it will accept names with fewer than 15 characters. Finally, the first character of the file name must be a reverse shifted "A" (CHR$(81)).

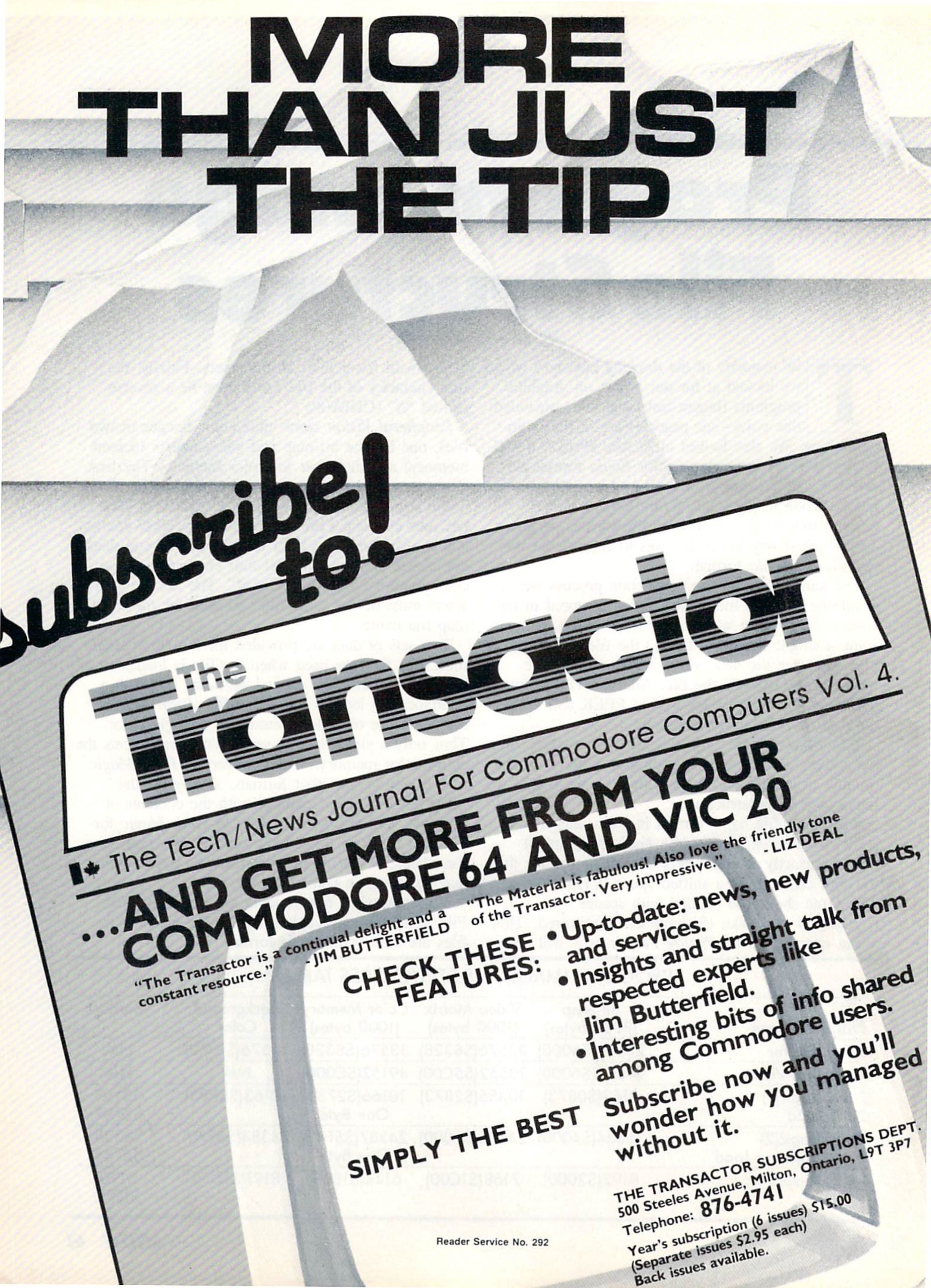
Peripheral Vision stores multicolor images in two files, one for the bit map and video matrix (screen memory) and the other for color memory. The first character of the bit map and video matrix file name is the British Pound (£) symbol (CHR$(92)). The last four characters are ".CMM". Any other characters can be used as a filler as long as the total does not exceed sixteen. The last four characters of the color memory file are ".CMM". The leading characters must be the same filler as used for the bit map file name.

Two sets of data are provided for the *Paint Magic* files. The first are used when the file is loaded as a BASIC program. The second set is for use with a nonrelocating load of the image file. *Paint Magic* limits the use of Color memory to a single color. Thus only a single byte is saved which represents the entire color memory. When converting *Paint Magic* files to any of the other formats, simply fill the 1,000 bytes of color memory with the contents of this byte. Converting other files to *Paint Magic* format will result in limited success for the same reason. There is just no provision for the data which may be stored in color memory.

Super Sketch is not listed in the Program Image File Structures table below, due to the fact that its files are already in *Koala* format. □

PROGRAM IMAGE FILE STRUCTURES TABLE

Program Name	Bit Map (8000 bytes)	Video Matrix (1000 bytes)	Color Memory (1000 bytes)	Background Color	Border
Koala Painter	24576($6000)	32576($8328)	33576($8328)	34576($8710)	N/A
Peripheral Vision	24576($6000)	23552($5C00)	49152($C000)	N/A	N/A
Paint Magic(1) Basic Load	2163($0873)	10355($2873)	10166($27B6) One Byte	10163($27B3)	10167 $27B7
Paint Magic(2) Non-relocating Load	16384($4000)	24576($6000)	24387($5F43) One Byte	24384($5F40)	24388 $5F44
Flying Colors	8192($2000)	7168($1C00)	6144($1800)	8191($1FFF)	8190 $1FFE


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COMMODARES

PROGRAMMING CHALLENGES

BY DALE RUPERT

Each month, we'll present several challenges designed to toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

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We will print and discuss the cleverest, simplest, shortest, most interesting and/or unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible, where appropriate.

Your original programming problems would be equally welcome!

Problem #11-1: Cray Confrontation

L. E. Masterson (Willard, OH) pointed out an article in *Science Times* (Feb. 11, 1984) describing the attempts at Sandia National Laboratories to factor a string of seventy-one numbers, all of which are ones. A later article indicated that the task had been completed. It took the Cray X-MP supercomputer 9½ hours to find two numbers which produced a string of seventy-one ones when multiplied together.

Of course finding the numbers in the first place was the hard part. But I'll give you a clue. One of the numbers is

```
241,573,142,393,627,673,576,957,
439,049
```

Your problem is to find the other number by using your Commodore computer. Send your answer and the program you used to get it. Can your program put 9½ hours to shame?

Problem #11-2: Pythagoras Extended

Martin Gardner in his book *The Incredible Dr. Matrix* mentions the extensions to the Pythagorean Theorem as follows:

3^2+4^2=5^2 (as everyone knows)
10^2+11^2+12^2=13^2+14^2
21^2+22^2+23^2+24^2=25^2+26^2+27^2

Your task is to find the next set of numbers in this sequence. The sum of the squares of what five consecutive integers equals the sum of the squares of the next four consecutive integers?

Problem #11-3: Bug Eliminator II

Sol Steinberg (Bellmawr, NJ) was the first to point out that *Problem #8-2: Bug Eliminator* was more trivial than it was intended to be. In fact, when the program ends, the cursor is still sitting on the bug. The real bug in the program was that there should have been a line 40 which moves the cursor home before the search for the screen bug begins.

Let's try it again. Write the rest of the program on page 83 titled *Bug Eliminator II* which will find the screen bug "*" and change it to a dead bug "0". The dots represent the bug's tail.

```
5 REM PROB. #11-3
6 REM BUG ELIMINATOR II
10 PRINT CHR$(147)
20 FOR L=1 TO RND(0)*1000
30 PRINT ".*" CHR$(157);:NEXT
40 PRINT CHR$(19)
50 REM..YOUR PRGM. STARTS HERE
```

Problem #11-4: Word Value

Using the values A=1, B=2, C=3, ..., Z=26, assign a value to each word the user types in which corresponds to the average of the letter values. For example the total value for GAD is 12 (7+1+4) so the average value is 4 (12/3). If the user types GAD, the computer responds with 4.

This month we will look at solutions submitted for the May, June, and July *Commodares*. First a suggestion. Many of you send nicely printed listings of your programs with nary a comment and (more important) without any printouts of your results. Since it is not feasible for me to type the several dozen listings I receive each month in order to see your results, I don't get to see many of your results. If you have a clever or interesting solution, take the time to tell me why it is, and if possible, show a hard copy display of your output. Your ideas are less likely to

be overlooked if you point them out to me. If you desire, you may send your solutions on disk or tape. I will return them if you enclose a self-addressed stamped envelope or mailing folder.

Ed Schewe (Mesa, AZ) sent a solution to *Problem #5-4: Letter Triangle* and an accompanying printout. He's new to computing, and he said that after a few hours of head-scratching and cussing he arrived at the following solution. (He has obviously learned two key aspects of programming already.)

```
10 FOR N=0 TO 25
20 FOR X=1 TO N+1 : PRINT CHR$(6
5+N); : NEXT : PRINT
30 NEXT N
```

Several readers sent solutions to *Problem #6-4: Graphic Rectangle.* Most solutions printed graphics characters on the screen. James Dunavant (Gainesville, FL) pointed out that POKEing allows the rectangle to completely fill the screen without the carriage return that normally messes up a printed image. Raymond Bowen (Augusta, AR) suggested a solution using POKEs. Try moving line 35 to the end of the program titled *Graphic Rectangle* on page 83 to see the rectangle rapidly appear. Also try to explain the unusual results when the height is an odd number. Can you explain why lines 5 and 35 work the way they do? Tell us all if you do.

Raymond Bowen also sent a compressed version of a solution to *Problem #6-3: String Challenge* shown on page 83 in slightly modified form.

To show the real power of machine language programming, Oscar Gauthier Jr. and Ron Fontaine (Gorham, NH) sent the solution to *Problem #7-2: Unscrambled Word* listed on page 83.

Their program tells how many possible combinations there are of the selected number of letters. If you select 10 letters to be scrambled, you may want to see only the first four letters. In that case respond to the "see all the letters" prompt with a four. Each time you press <RETURN> an additional 24 permutations are displayed until all have been shown. Pressing "E" ends the display. Just hold down the <RETURN> key and watch as all 3,628,800 permutations of ten letters rapidly flash before your eyes. Thanks for an impressive program, Oscar and Ron!

Other readers, Raymond Ketchledge (Englewood, FL) and W. A. Storer, Jr. (Des Moines, IA), also sent workable solutions to this problem, indicating that they use such a program to solve the *Jumble* puzzle in their daily newspaper. Computers really *are* useful, aren't they!

Michael Vail (Thompson, PA), Aldo Martinez (Miami, FL), Harold Corbett (Windsor, ONT), and Brian Kearney (Meriden, CT) sent solutions to *Commodares Problems 7-3: Letter Count* and *7-4: Word Count.*

Suggestions for *Problem #7-1: Definite Ending* were received from Eldon Kennedy (Santa Fe, NM), Patrick Tessier (Sudbury, ONT), Dennis McGrath (Cicero, IL), and Plummer Hensley (Sparta, TN). Dennis McGrath used the statements WAIT 160,64 : WAIT 160,64,64 to check the software clock within the midst of multiple FOR-NEXT loops. The loops are only allowed to be incremented once every 2 days according to McGrath. Unfortunately the solutions from all writers depended upon a FOR-NEXT loop being incremented in steps of 1E-38 or less, which as we saw in the August *Commodares* just doesn't happen. The problem once again is to write a one line program that a) eventually ends, b) produces a changing display, and c) takes as long as possible before it ends. Keep those thinking caps on. That WAIT idea looks like a good possibility.

Congratulations also this month to Hugh Rountree (Perry, FL), S. J. Mills (Mountainside, NJ), John Auresto (Carmel, NY), Eddie Johnson (Albuquerque, NM), Andrew Caird (Petoskey, MI), Glenn Elliott (Rutherford, NJ), Gregg Leonard (Dayville, CT), and Jack Shaffer (Hughesville, PA) for their solutions to various *Commodares.* Jack Shaffer repeated a frequent request for a program to dump the hi-res screen to the VIC 1525 graphics printer. If any readers have such a program and want to share it, send it along. Keep those computers humming. □

RUPERT REPORT

Continued from page 48

first, then rows (remember the zero subscripts). The remaining pairs of values are the actual data stored in the array. Are they stored by rows or by columns?

You may modify this program to dig even deeper into multiple arrays and greater-dimensioned arrays. As new variables are defined, the arrays get moved around in memory. Therefore you must be sure that all variables in your program are defined *before* the pointers are evaluated in lines 50 and 60. That's the purpose of line 40.

Two dimensional arrays are used for much more than string storage. The concept of spreadsheet programs is based upon a two dimensional array which contains numeric and string data as well as rules for defining the contents of each of the elements. We will look at other uses of multi-dimensional arrays in future articles. □

FLOTSAM

Continued from page 6

trouble typing in all your programs.

I hate to gripe, because I really do like your magazine. It's just very frustrating to punch a program in only to have it crash.

—*Paul Lalli*
McAlester, OK

Good news for all readers who've had difficulty with our programs: we're implementing a new format for our listings with this issue. Refer to page 67 before entering any programs.

If you read Anthony Scarpelli's Building a Cassette Interface for the C-64 *in our September issue, you probably noticed one serious omission—that of the parts list referred to in the body of the article. Our apologies to those readers who had to piece the information together from various places in the article. For those who haven't undertaken the project yet, we present the list here.*

PARTS LIST

Qty	Description	Jameco #	Price	Radio Shack #	Price
1	6-Contact PC Edge Conn.*	50-6A-20	$2.29		
1	44 position Edge Conn.*			276-1551	$2.99
1	DIP Plugboard*	3662	9.95		
1	Multi-purpose board*			276-152	3.69
1	74LS04 Hex inverter	74LS04	.35	276-1802	.79
3	.01 mfd 50v capacitors	DC .01/50	.08 ea.	272-1065	2/.59
1	100 ohm 1/4w resistor	100 ohm	5/.30	271-1311	5/.39
2	330 "	330 "	"	271-1315	"
1	1000 "	1K "	"	271-1321	"
2	10000 "	10K "	"	271-1335	"
1	1500 "*	1.5K "	"		
1	1500 ohm 1/2w*			271-025	2/.19
3	1N914 diodes	1N4148	15/1.00	276-1122	10/.99
1	1N4001 rectifier	1N4001	12/1.00	276-1101	2/.49
1	5v reed relay			275-232	1.49
1	4x2x13/16 box			270-220	1.69
2	1/8" phone plug			274-286	2/1.29
1	2/32" phone plug			274-289	2/.99
9'	audio cable			278-752	30'/3.29
1	SPDT toggle switch*	FTD01/JMT123	1.49		
1	SPST toggle switch*			275-624	1.49

*Indicates alternate selections, only one is needed.

Note: Any price that indicates x/.xx means single quantities cannot be purchased.

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097
Postage—5% of total, $1.00 min.

PROGRAM LISTINGS

As of this issue we will be utilizing an improved method of printing our program listings. This new method will make entering programs easier for you, but only if you read this entire page carefully before proceeding!

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: 22 spaces, for example, as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines, long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the VIC 20 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent Line Codes* that follow each program listing should *not* be typed in. See the instructions preceding each program.) □

When You See	It Means	You Type	You Will See
[CLEAR]	Screen Clear	SHIFT CLR/HOME	
[HOME]	Home	CLR/HOME	
[UP]	Cursor Up	SHIFT ↑CRSR↓	
[DOWN]	Cursor Down	↑CRSR↓	
[LEFT]	Cursor Left	SHIFT ←CRSR→	
[RIGHT]	Cursor Right	←CRSR→	
[SS]	Shifted Space	SHIFT Space	
[INSERT]	Insert	SHIFT INST/DEL	
[DEL]	Delete	INST/DEL	
[RVSON]	Reverse On	CNTRL 9	
[RVSOFF]	Reverse Off	CNTRL 0	
[UPARROW]	Up Arrow	↑	
[BACKARROW]	Back Arrow	←	
[PI]	PI	π	
[EP]	English Pound	£	

When You See	It Means	You Type	You Will See
[BLACK]	Black	CNTRL 1	
[WHITE]	White	CNTRL 2	
[RED]	Red	CNTRL 3	
[CYAN]	Cyan	CNTRL 4	
[PURPLE]	Purple	CNTRL 5	
[GREEN]	Green	CNTRL 6	
[BLUE]	Blue	CNTRL 7	
[YELLOW]	Yellow	CNTRL 8	
[F1]	Function 1	F1	
[F2]	Function 2	SHIFT F1	
[F3]	Function 3	F3	
[F4]	Function 4	SHIFT F3	
[F5]	Function 5	F5	
[F6]	Function 6	SHIFT F5	
[F7]	Function 7	F7	
[F8]	Function 8	SHIFT F7	

IMPORTANT!
Before typing in the *Bug Repellent* and other *Ahoy!* programs, refer to the information on page 67.

VIC 20 BUG REPELLENT

By Michael Kleinert and David Barron

The program listed below will allow you to quickly debug any *Ahoy!* program you type in on your VIC 20. Follow directions for cassette or disk.

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed below the program on this page. (If you didn't type the program properly, of course, no line codes will be generated. You'll have to debug the *Bug Repellent* itself the hard way.)

Once you've got a working *Bug Repellent,* type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the VIC *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent.*

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: type in the *Bug Repellent,* save it, and type RUN:NEW[RETURN]. (See above regarding testing the *Bug Repellent* on itself.) Type in the program you wish to check, then SYS 828. This will generate a set of two-letter line codes that you should compare to those listed in the magazine.

To pause the line codes listing, press SHIFT. To permanently pause it, press SHIFT LOCK. To continue, release SHIFT LOCK.

To send the list to the printer type OPEN 4,4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

```
•63000 FOR X = 828 TO 1023 :READ Y
 :POKE X,Y:NEXT:END
•63001 DATA 169, 0, 133, 63, 133,
 64, 165, 43, 133, 251
•63002 DATA 165, 44, 133, 252, 160
 , 0, 132, 254, 32, 228
•63003 DATA 3, 234, 177, 251, 208,
  3, 76, 208, 3, 230
•63004 DATA 251, 208, 2, 230, 252,
  169, 244, 160, 3, 32
•63005 DATA 30, 203, 160, 0, 177,
 251, 170, 230, 251, 208
•63006 DATA 2, 230, 252, 177, 251,
  32, 205, 221, 169, 58
•63007 DATA 32, 210, 255, 169, 0,
 133, 253, 230, 254, 32
•63008 DATA 228, 3, 234, 165, 253,
  160, 0, 170, 177, 251
•63009 DATA 201, 32, 240, 6, 138,
 113, 251, 69, 254, 170
•63010 DATA 138, 133, 253, 177, 25
1, 208, 226, 165, 253, 41
•63011 DATA 240, 74, 74, 74, 74, 2
4, 105, 65, 32, 210
•63012 DATA 255, 165, 253, 41, 15,
  24, 105, 65, 32, 210
•63013 DATA 255, 169, 13, 32, 210,
  255, 173, 141, 2, 41
•63014 DATA 1, 208, 249, 230, 63,
 208, 2, 230, 64, 230
•63015 DATA 251, 208, 2, 230, 252,
  76, 74, 3, 169, 236
•63016 DATA 160, 3, 32, 30, 203, 1
66, 63, 165, 64, 32
•63017 DATA 205, 221, 169, 13, 32,
  210, 255, 96, 230, 251
•63018 DATA 208, 2, 230, 252, 96,
0, 76, 73, 78, 69
•63019 DATA 83, 58, 32, 0, 76, 73,
 78, 69, 32, 35
•63020 DATA 32, 0, 0, 0, 0, 0
```

BUG REPELLENT LINE CODES FOR VIC 20 BUG REPELLENT

```
LINE # 63000:MH    LINE # 63011:NN
LINE # 63001:BD    LINE # 63012:IG
LINE # 63002:FO    LINE # 63013:EN
LINE # 63003:ND    LINE # 63014:GJ
LINE # 63004:DJ    LINE # 63015:IK
LINE # 63005:LP    LINE # 63016:HG
LINE # 63006:JB    LINE # 63017:CK
LINE # 63007:JF    LINE # 63018:JF
LINE # 63008:KA    LINE # 63019:OH
LINE # 63009:HP    LINE # 63020:LH
LINE # 63010:KJ    LINES: 21
```

C-64 BUG REPELLENT

By Michael Kleinert and David Barron

The program listed below will allow you to quickly debug any *Ahoy!* program you type in on your C-64.

Type in, SAVE, and RUN the *Bug Repellent*, Type NEW, then type in or LOAD the *Ahoy!* program you wish to check. When that's done, SAVE your program (don't RUN it!) and type SYS 49152 [RETURN]. You'll be asked if you want the line value codes displayed on the screen or dumped to the printer. If you select screen, it will appear there.

The table will move quickly, too quickly for most mortals to follow. To pause the listing depress and hold the SHIFT key. To pause for an extended period, depress SHIFT LOCK. As long as it is locked, the display will remain frozen.

Compare the table your machine generates to the table in *Ahoy!* that follows the program you're entering: If you spot a difference, an error exists in that line. Jot down the numbers of lines where contradictions occur, LIST each line, spot the errors, and correct them.

```
•5000 FOR X = 49152 TO 49488 :READ
 Y:POKE X,Y:NEXT:END
•5001 DATA 32, 161, 192, 165, 43,
133, 251, 165, 44, 133
•5002 DATA 252, 160, 0, 132, 254,
32, 37, 193, 234, 177
•5003 DATA 251, 208, 3, 76, 138, 1
92, 230, 251, 208, 2
•5004 DATA 230, 252, 76, 43, 192,
76, 73, 78, 69, 32
•5005 DATA 35, 32, 0, 169, 35, 160
, 192, 32, 30, 171
•5006 DATA 160, 0, 177, 251, 170,
230, 251, 208, 2, 230
•5007 DATA 252, 177, 251, 32, 205,
 189, 169, 58, 32, 210
•5008 DATA 255, 169, 0, 133, 253,
230, 254, 32, 37, 193
•5009 DATA 234, 165, 253, 160, 0,
76, 13, 193, 133, 253
•5010 DATA 177, 251, 208, 237, 165
, 253, 41, 240, 74, 74
•5011 DATA 74, 74, 24, 105, 65, 32
, 210, 255, 165, 253
•5012 DATA 41, 15, 24, 105, 65, 32
, 210, 255, 169, 13
•5013 DATA 32, 220, 192, 230, 63,
208, 2, 230, 64, 230
•5014 DATA 251, 208, 2, 230, 252,
76, 11, 192, 169, 153
•5015 DATA 160, 192, 32, 30, 171,
166, 63, 165, 64, 76
•5016 DATA 231, 192, 96, 76, 73, 7
8, 69, 83, 58, 32
•5017 DATA 0, 169, 247, 160, 192,
32, 30, 171, 169, 3
•5018 DATA 133, 254, 32, 228, 255,
 201, 83, 240, 6, 201
•5019 DATA 80, 208, 245, 230, 254,
 32, 210, 255, 169, 4
•5020 DATA 166, 254, 160, 255, 32,
 186, 255, 169, 0, 133
•5021 DATA 63, 133, 64, 133, 2, 32
, 189, 255, 32, 192
•5022 DATA 255, 166, 254, 32, 201,
 255, 76, 73, 193, 96
•5023 DATA 32, 210, 255, 173, 141,
 2, 41, 1, 208, 249
•5024 DATA 96, 32, 205, 189, 169,
13, 32, 210, 255, 32
•5025 DATA 204, 255, 169, 4, 76, 1
95, 255, 147, 83, 67
•5026 DATA 82, 69, 69, 78, 32, 79,
 82, 32, 80, 82
•5027 DATA 73, 78, 84, 69, 82, 32,
 63, 32, 0, 76
•5028 DATA 44, 193, 234, 177, 251,
 201, 32, 240, 6, 138
•5029 DATA 113, 251, 69, 254, 170,
 138, 76, 88, 192, 0
•5030 DATA 0, 0, 0, 230, 251, 208,
 2, 230, 252, 96
•5031 DATA 170, 177, 251, 201, 34,
 208, 6, 165, 2, 73
•5032 DATA 255, 133, 2, 165, 2, 20
8, 218, 177, 251, 201
•5033 DATA 32, 208, 212, 198, 254,
 76, 29, 193, 0, 169
•5034 DATA 13, 76, 210, 255, 0, 0,
 0
```

BUG REPELLENT LINE CODES FOR C-64 BUG REPELLENT

```
LINE # 5000:GJ      LINE # 5018:FK
LINE # 5001:DL      LINE # 5019:FL
LINE # 5002:DB      LINE # 5020:CL
LINE # 5003:OF      LINE # 5021:GC
LINE # 5004:KN      LINE # 5022:NN
LINE # 5005:CA      LINE # 5023:NH
LINE # 5006:CE      LINE # 5024:IM
LINE # 5007:JE      LINE # 5025:KC
LINE # 5008:CL      LINE # 5026:DC
LINE # 5009:NB      LINE # 5027:ML
LINE # 5010:MB      LINE # 5028:GN
LINE # 5011:EP      LINE # 5029:JK
LINE # 5012:GH      LINE # 5030:NA
LINE # 5013:AN      LINE # 5031:DM
LINE # 5014:NG      LINE # 5032:JA
LINE # 5015:BF      LINE # 5033:FM
LINE # 5016:EP      LINE # 5034:PA
LINE # 5017:PJ      LINES: 35
```

PTE

FROM PAGE 44

```
·10 REM ******************************
*******
·15 REM PERSONAL TEXT EDITOR (C)
1984
·20 REM BY PETER LOBL FOR AHOY! M
AGAZINE
·30 REM THANKS TO THE WHOLE STAFF
 FOR
·40 REM GRANTING MY FLEXIBLE DEAD
LINES.
·50 REM IF ANYONE OUT THERE NEEDS
 A 16
·60 REM YEAR OLD PROGRAMMER AT A
GOOD
·70 REM RATE CALL (516) 957-1512.
·80 REM HAVE COMPUTER, WILL TRAVE
L...
·85 REM ( FOR THE RIGHT PRICE. )
·90 REM ******************************
*******
·100 :
·110 POKE53280,14:POKE53281,6
·120 PRINTCHR$(14)"[CLEAR][DOWN][
5"[RIGHT]"][RVSON] [s A]HOY'S [s
 P]ERSONAL [s T]EXT [s E]DITOR "
·130 PRINT"[DOWN][5"[RIGHT]"][s P
]LEASE WAIT, LOADING IN DATA.[3"
[DOWN]"]"
·140 DIMCH(16):READGC:FORI=1TO16:
READCH(I):CH=CH+CH(I):NEXT
·150 IFCH<>GCTHENPRINT"[s E]RROR
IN CHECKSUMS [4"!"]":STOP
·160 M=49152:FORI=1TO16:C=.:FORJ=
.TO255:READA:C=C+A:POKEM+J,A:NEX
T:M=M+256
·170 IFC<>CH(I)THENPRINT"[s E]RRO
R IN DATA BLOCK"I:STOP
·180 NEXT:READLC:C=.:FORI=848TO92
3:READA:C=C+A:POKEI,A:NEXT
·190 IFC<>LCTHENPRINT"[s E]RROR I
N [s R]ELOCATER/[s S]AVER DATA [
4"!"]":STOP
·200 PRINT"[s D]ATA IS CORRECT (A
S FAR AS [s I] CAN TELL)!!"
·210 PRINT"[DOWN][DOWN][s P]LEASE
 ENTER THE FILE NAME FOR THIS"
·220 PRINT"[DOWN]PROGRAM (THIS WI
LL BE ITS NAME ON THE"
·230 PRINTSPC(23)"[16"[c @]"]"
·240 PRINTSPC(23)"[DOWN][16"[c T]
"[3"[UP]"]"
·250 PRINT"DISK DIRECTORY). [4"-"
]> ";
·260 OPEN1,.:INPUT#1,A$:PRINT:CLO
SE1:L=LEN(A$)
·270 IFL>16THENPRINT"[CLEAR][DOWN
][RVSON][s F]ILE NAME TOO BIG (1
6 CHARS MAX) [3"!"]":GOTO90
·280 POKE827,L:FORI=1TOL:POKE827+
I,ASC(MID$(A$,I,1)):NEXT
·290 PRINT"[DOWN][DOWN][RVSON] [s
 P]LEASE INSERT A DISK THEN HIT
ANY KEY. ":POKE198,0:WAIT198,1
·300 POKE198,5:POKE631,76:POKE632
,73:POKE633,83:POKE634,84:POKE63
5,13:SYS848
·310 :
·320 REM GRAND CHECKSUM *****
·330 DATA 429548
·340 REM CHECKSUMS *****
·350 DATA 27411,29699,28928,26463
,23862,21431,17514,16691,31122
·360 DATA 32378,29778,28740,28529
,30856,26097,30049
·370 REM BLOCK 1  *****
·380 DATA0,11,8,255,255,158,50,48
,54,49,0,0,0,169,14,141
·390 DATA76,232,141,134,2,32,210,
255,32,140,9,166,213,142,220,12
·400 DATA232,142,221,12,169,4,166
,1,224,55,240,2,169,128,141,227
·410 DATA12,32,217,8,32,159,9,32,
131,9,141,219,12,76,125,11
·420 DATA32,43,9,32,199,9,201,32,
144,12,201,96,144,11,201,193
·430 DATA144,4,201,219,144,5,76,2
07,9,41,63,41,127,160,0,145
·440 DATA45,174,217,12,232,236,22
1,12,240,12,142,217,12,230,45,20
8
·450 DATA2,230,46,76,64,8,238,219
,12,208,6,206,219,12,76,64
·460 DATA8,140,217,12,174,218,12,
232,142,218,12,224,25,240,3,76
·470 DATA64,8,32,55,9,206,218,12,
32,61,9,76,64,8,138,168
·480 DATA224,0,240,15,24,165,47,1
09,221,12,133,47,144,2,230,48
·490 DATA202,208,241,152,170,24,9
6,138,168,224,0,240,15,24,165,45
·500 DATA109,221,12,133,45,144,2,
230,46,202,208,241,152,170,24,96
·510 DATA56,173,219,12,237,218,12
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
,24,96,173,227,12,133,46,169,0
·520 DATA133,45,169,24,133,48,169
,0,133,47,96,162,25,142,223,12
·530 DATA162,1,160,0,173,224,12,2
08,7,177,45,145,47,76,4,9
·540 REM BLOCK 2  *****
·550 DATA177,47,145,45,200,204,22
1,12,208,234,32,183,8,32,158,8
·560 DATA206,223,12,208,221,96,32
,217,8,174,218,12,32,183,8,165
·570 DATA45,109,217,12,133,45,144
,2,230,46,96,32,22,9,160,0
·580 DATA177,45,73,128,145,45,96,
32,79,9,76,235,8,32,79,9
·590 DATA238,224,12,76,235,8,32,5
5,9,206,219,12,76,61,9,32
·600 DATA208,8,170,32,217,8,141,2
24,12,76,158,8,174,219,12,232
·610 DATA240,19,32,55,9,173,227,1
2,141,225,12,169,24,141,227,12
·620 DATA32,217,8,169,1,96,160,0,
177,45,145,47,200,204,221,12
·630 DATA208,246,96,169,0,141,217
,12,141,218,12,96,169,14,141,33
·640 DATA208,141,32,208,169,147,3
2,210,255,169,6,141,33,208,96,16
0
·650 DATA0,32,226,8,169,32,162,17
6,145,47,200,208,251,230,48,232
·660 DATA208,246,96,133,49,134,50
,160,0,177,49,240,245,32,210,255
·670 DATA200,208,246,230,50,208,2
42,32,228,255,201,0,240,249,96,7
2
·680 DATA32,43,9,160,0,104,201,17
,208,6,172,217,12,76,118,8
·690 DATA201,141,208,3,76,118,8,2
01,29,208,3,76,97,8,201,13
·700 DATA208,32,173,217,12,72,169
,159,145,45,169,32,200,174,217,1
2
·710 REM BLOCK 3  *****
·720 DATA232,142,217,12,236,221,1
2,208,239,160,0,104,141,217,12,7
6
·730 DATA118,8,201,3,208,21,174,2
22,12,232,224,8,144,2,162,0
·740 DATA142,222,12,189,30,13,145
,45,76,64,8,201,19,208,12,32
·750 DATA208,8,141,219,12,32,131,
9,76,64,8,201,147,208,15,32
·760 DATA55,9,32,131,9,141,219,12
,32,61,9,76,64,8,201,20
·770 DATA208,37,174,217,12,240,29
,206,217,12,32,22,9,174,217,12
·780 DATA160,1,177,45,136,145,45,
200,200,232,236,220,12,208,243,1
36
·790 DATA169,32,145,45,76,64,8,20
1,148,208,33,173,217,12,205,220
·800 DATA12,240,241,56,173,220,12
,237,217,12,233,1,168,177,45,200
·810 DATA145,45,136,240,4,136,76,
141,10,76,112,10,201,157,208,42
·820 DATA173,217,12,240,6,206,217
,12,76,64,8,173,218,12,240,15
·830 DATA206,218,12,206,219,12,17
3,220,12,141,217,12,76,64,8,173
·840 DATA219,12,240,248,32,70,9,7
6,182,10,201,145,208,25,173,218
·850 DATA12,240,9,206,218,12,206,
219,12,76,64,8,173,219,12,240
·860 DATA248,32,70,9,76,64,8,201,
160,208,19,32,208,8,105,24
·870 DATA141,219,12,32,131,9,169,
24,141,218,12,76,64,8,201,18
·880 REM BLOCK 4  *****
·890 DATA208,74,32,92,9,240,66,16
2,255,32,158,8,202,32,183,8
·900 DATA32,118,9,236,219,12,240,
28,202,56,165,45,237,221,12,133
·910 DATA45,176,2,198,46,56,165,4
7,237,221,12,133,47,176,2,198
·920 DATA48,76,16,11,160,0,169,32
,145,45,200,204,221,12,208,248
·930 DATA173,225,12,141,227,12,32
,61,9,76,64,8,201,146,208,35
·940 DATA32,92,9,240,244,174,219,
12,32,158,8,232,32,183,8,32
·950 DATA118,9,138,72,162,1,32,15
8,8,32,183,8,104,170,232,240
·960 DATA195,208,236,201,131,240,
3,76,87,22,32,55,9,32,140,9
·970 DATA169,38,162,13,32,179,9,3
2,199,9,41,127,201,69,208,9
·980 DATA32,140,9,32,61,9,76,64,8
,201,81,208,18,169,158,162
·990 DATA14,32,179,9,32,29,16,208
,3,76,125,11,108,252,255,201
·1000 DATA67,208,24,169,207,162,1
4,32,179,9,32,29,16,240,9,32
·1010 DATA159,9,32,131,9,141,219,
12,76,125,11,201,83,240,3,76
·1020 DATA89,18,169,170,162,14,32
,179,9,169,0,141,250,12,169,2
·1030 DATA141,237,12,169,147,32,4
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2,17,162,1,173,230,12,240,7,32
·1040 DATA226,8,206,237,12,202,32
,158,8,165,47,133,51,165,48,133
·1050 REM BLOCK 5  *****
·1060 DATA52,169,211,32,42,17,173
,230,12,240,11,206,237,12,32,153
·1070 DATA16,162,255,32,158,8,165
,47,133,53,165,48,133,54,173,237
·1080 DATA12,208,7,169,113,162,15
,32,179,9,32,171,16,174,238,12
·1090 DATA208,3,76,125,11,32,181,
16,32,195,16,32,209,16,169,149
·1100 DATA162,15,32,179,9,32,83,1
7,240,3,76,129,17,162,1,32
·1110 DATA201,255,160,0,177,51,20
1,159,208,5,169,13,76,133,12,201
·1120 DATA91,176,82,201,65,144,5,
9,128,76,114,12,201,32,176,58
·1130 DATA9,64,174,244,12,240,14,
201,96,144,5,41,127,76,170,12
·1140 DATA9,32,76,170,12,174,251,
12,240,17,201,13,208,13,169,13
·1150 DATA32,210,255,169,10,32,21
0,255,76,187,12,201,13,208,11,32
·1160 DATA210,255,32,83,17,240,20
,76,129,17,32,210,255,32,83,17
·1170 DATA240,3,76,129,17,200,204
,221,12,208,153,24,165,51,109,22
1
·1180 DATA12,133,51,144,2,230,52,
165,51,197,53,208,133,165,52,197
·1190 DATA54,208,248,32,96,17,76,
125,11,0,0,0,0,0,255,0
·1200 DATA0,0,0,0,0,0,0,0,0,0,0
·1205 DATA80:REM # COLUMNS ON PRI
NTER
·1206 DATA2:REM LINE SPACING ON W
ORD WRAP
·1207 DATA0,0
·1208 DATA0:REM PRINTER SECONDARY
 ADDRESS
·1210 DATA4:REM PRINTER DEVICE #
·1211 DATA8:REM DISK DEVICE #
·1212 DATA13:REM FIRST CHARACTER
TO SEND TO PRINTER <CARRIAGE RET
URN>
·1213 DATA17:REM SECOND CHARACTER
 TO SEND TO PRINTER <LOWER CASE
(ON CBM)>
·1214 DATA0,0,0,0,0,0,0,0,201,0,2
08,2
·1220 REM BLOCK 6  *****
·1230 DATA56,96,157,128,8,232,76,
245,12,202,142,119,8,0,96,32
·1240 DATA209,21,144,17,174,110,8
,189,128,8,201,62,208,3,147,211
·1250 DATA204,144,208,141,205,212
,147,17,32,32,32,32,32,32,32,32
·1260 DATA32,208,69,82,83,79,78,6
5,76,32,212,69,88,84,32,197
·1270 DATA68,73,84,79,82,32,93,91
,13,32,32,32,32,32,32,32
·1280 DATA32,32,183,183,183,183,1
83,183,183,183,183,183,183,183,1
83,183
·1290 DATA183,183,183,183,183,183
,183,183,183,13,32,32,32,32,32,3
2
·1300 DATA32,214,69,82,83,73,79,7
8,32,52,47,55,47,56,52,32
·1310 DATA66,89,32,208,69,84,69,3
2,204,79,66,76,13,17,17,32
·1320 DATA32,32,32,40,195,41,32,4
9,57,56,52,32,32,201,78,68
·1330 DATA69,67,69,78,84,32,197,8
8,80,79,83,85,82,69,83,32
·1340 DATA204,84,68,46,13,17,32,3
2,32,32,32,32,32,193,32,212
·1350 DATA73,77,69,32,79,70,32,21
7,79,85,82,32,204,73,70,69
·1360 DATA32,195,79,77,80,65,78,8
9,13,17,17,17,32,32,32,32
·1370 DATA32,32,32,32,32,32,32,32
,32,195,79,77,77,65,78,68
·1380 DATA83,32,205,69,78,85,13,3
2,32,32,32,32,32,32,32,32
·1390 REM BLOCK 7  *****
·1400 DATA32,32,32,32,163,163,163
,163,163,163,163,163,163,163,163
,163
·1410 DATA163,13,32,32,32,32,32,2
11,32,45,32,211,65,86,69,32
·1420 DATA32,208,32,45,32,208,82,
73,78,84,32,32,197,32,45,32
·1430 DATA197,68,73,84,13,17,32,3
2,32,32,32,32,32,32,32,32
·1440 DATA32,204,32,45,32,204,79,
65,68,32,32,198,32,45,32,198
·1450 DATA73,78,68,13,17,32,32,32
,32,32,205,32,45,32,205,79
·1460 DATA86,69,32,32,195,32,45,3
2,195,76,69,65,82,32,32,209
·1470 DATA32,45,32,209,85,73,84,1
3,17,17,32,32,32,32,32,200
·1480 DATA73,84,32,84,72,69,32,76
,69,84,84,69,82,32,79,70
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IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
•1490 DATA32,89,79,85,82,32,67,72
,79,73,67,69,46,0,147,17
•1500 DATA17,18,81,85,73,84,17,17
,13,0,147,17,17,18,83,65
•1510 DATA86,69,17,17,13,0,147,17
,17,18,76,79,65,68,17,17
•1520 DATA13,0,147,17,17,18,80,82
,73,78,84,17,17,13,0,147
•1530 DATA17,17,18,67,76,69,65,82
,17,17,13,0,13,193,82,69
•1540 DATA32,89,79,85,82,32,83,85
,82,69,32,40,217,47,206,41
•1550 DATA32,63,0,13,215,79,82,68
,32,87,82,65,80,32,40,217
•1560 REM BLOCK 8  *****
•1570 DATA47,206,41,32,63,0,13,19
5,72,65,78,71,69,32,84,72
•1580 DATA73,83,32,79,78,69,32,40
,217,47,206,41,32,63,0,13
•1590 DATA197,78,84,69,82,32,70,7
3,76,69,32,78,65,77,69,46
•1600 DATA32,0,13,197,78,84,69,82
,32,83,84,82,73,78,71,32
•1610 DATA84,79,32,70,73,78,68,46
,32,0,13,197,78,84,69,82
•1620 DATA32,78,69,87,32,83,84,82
,73,78,71,46,32,0,19,17
•1630 DATA17,17,17,17,17,17,17,17
,17,17,17,17,17,17,17,17
•1640 DATA0,18,206,79,32,77,65,82
,75,69,82,83,32,80,82,69
•1650 DATA83,69,78,84,46,13,0,13,
18,204,79,65,68,73,78,71
•1660 DATA46,46,46,13,0,13,18,211
,65,86,73,78,71,46,46,46
•1670 DATA13,0,13,18,208,82,73,78
,84,73,78,71,46,46,46,13
•1680 DATA0,13,13,18,201,47,207,3
2,197,82,82,79,82,32,33,33
•1690 DATA33,13,0,13,13,13,18,200
,73,84,32,65,32,75,69,89
•1700 DATA32,84,79,32,67,79,78,84
,73,78,85,69,46,13,0,13
•1710 DATA206,69,69,68,32,193,211
,195,201,201,32,84,82,65,78,83
•1720 DATA76,65,84,73,79,78,32,40
,217,47,206,41,32,63,0,13
•1730 REM BLOCK 9  *****
•1740 DATA206,69,69,68,32,65,68,6
8,69,68,32,76,73,78,69,70
•1750 DATA69,69,68,83,32,40,217,4
7,206,41,32,63,0,169,220,162
•1760 DATA14,32,179,9,32,199,9,41
,127,160,1,201,89,240,5,201
•1770 DATA78,208,241,136,72,169,3
2,32,210,255,104,32,210,255,169,
13
•1780 DATA32,210,255,192,0,96,162
,0,142,238,12,169,164,32,210,255
•1790 DATA169,157,32,210,255,32,1
99,9,174,238,12,201,13,240,48,20
1
•1800 DATA20,240,33,201,32,144,23
8,201,96,144,8,201,193,144,230,2
01
•1810 DATA219,176,226,224,16,240,
222,232,142,238,12,157,251,12,32
,210
•1820 DATA255,76,75,16,174,238,12
,240,204,206,238,12,76,126,16,16
9
•1830 DATA32,32,210,255,169,13,76
,210,255,169,0,133,53,162,64,173
•1840 DATA221,12,201,40,240,2,162
,128,134,54,96,169,31,162,15,32
•1850 DATA179,9,76,70,16,169,223,
162,15,32,179,9,32,36,16,140
•1860 DATA244,12,96,169,255,162,1
5,32,179,9,32,36,16,140,251,12
•1870 DATA96,174,238,12,169,44,23
2,157,251,12,232,169,87,157,251,
12
•1880 DATA142,238,12,160,3,174,24
1,12,173,227,12,201,4,208,18,169
•1890 DATA1,32,186,255,173,238,12
,162,252,160,12,32,189,255,76,19
2
•1900 REM BLOCK 10 *****
•1910 DATA255,134,212,132,211,169
,1,133,210,173,238,12,133,209,16
9,252
•1920 DATA133,218,169,12,133,219,
24,173,193,255,105,3,141,40,17,1
73
•1930 DATA194,255,105,0,141,41,17
,76,125,11,141,229,12,32,226,8
•1940 DATA141,228,12,141,230,12,1
62,1,160,0,177,47,205,229,12,240
•1950 DATA17,200,204,221,12,208,2
43,32,158,8,238,228,12,208,233,2
38
•1960 DATA230,12,96,173,227,12,20
1,4,208,3,76,183,255,165,150,96
•1970 DATA173,250,12,240,10,169,1
3,32,210,255,169,10,32,210,255,1
73
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·1980 DATA227,12,201,4,240,3,76,1
83,23,169,1,32,195,255,76,204
·1990 DATA255,32,96,17,169,177,16
2,15,32,179,9,169,195,162,15,32
·2000 DATA179,9,32,199,9,76,125,1
1,174,238,12,202,189,252,12,201
·2010 DATA193,176,2,41,63,41,127,
157,252,12,224,0,208,237,96,174
·2020 DATA249,12,202,189,14,13,20
1,193,176,2,41,63,41,127,157,14
·2030 DATA13,224,0,208,237,96,174
,246,12,232,236,221,12,208,8,238
·2040 DATA245,12,208,1,96,162,0,1
42,246,12,32,226,8,174,245,12
·2050 DATA32,158,8,172,246,12,162
,0,177,47,221,252,12,208,31,232
·2060 DATA236,238,12,208,58,32,79
,18,56,152,237,226,12,141,246,12
·2070 REM BLOCK 11 *****
·2080 DATA176,9,109,221,12,141,24
6,12,206,245,12,169,1,96,142,225
·2090 DATA12,56,152,237,225,12,17
6,20,109,221,12,72,206,245,12,56
·2100 DATA165,47,237,221,12,133,4
7,176,2,198,48,104,168,162,0,200
·2110 DATA204,221,12,208,179,138,
72,174,245,12,232,208,4,104,169,
0
·2120 DATA96,142,245,12,162,1,32,
158,8,104,170,160,0,240,153,56
·2130 DATA173,238,12,233,1,141,22
6,12,96,201,70,240,3,76,126,19
·2140 DATA169,0,141,246,12,141,24
5,12,32,140,9,169,50,162,15,32
·2150 DATA179,9,32,70,16,32,140,9
,173,238,12,208,3,76,125,11
·2160 DATA32,152,17,32,218,17,240
,245,56,173,245,12,233,6,176,2
·2170 DATA169,0,141,247,12,24,173
,245,12,105,7,144,2,169,255,141
·2180 DATA248,12,32,217,8,174,247
,12,32,158,8,160,0,177,47,145
·2190 DATA45,200,204,221,12,208,2
46,138,72,162,1,32,158,8,32,183
·2200 DATA8,104,170,232,236,248,1
2,208,226,32,217,8,174,247,12,23
6
·2210 DATA245,12,240,13,232,138,7
2,162,1,32,183,8,104,170,76,207
·2220 DATA18,162,0,172,246,12,177
,45,9,128,145,45,200,232,236,238
·2230 DATA12,208,243,169,94,162,1
5,32,179,9,169,6,162,15,32,179
·2240 REM BLOCK 12 *****
·2250 DATA9,32,36,16,208,3,76,112
,19,169,74,162,15,32,179,9
·2260 DATA169,13,141,124,16,169,1
3,141,125,16,173,238,12,72,32,70
·2270 DATA16,173,238,12,141,249,1
2,104,141,238,12,169,251,141,124
,16
·2280 DATA169,12,141,125,16,173,2
49,12,208,3,76,125,11,173,249,12
·2290 DATA205,238,12,176,14,174,2
49,12,169,32,157,14,13,232,236,2
38
·2300 DATA12,208,247,32,175,17,32
,226,8,174,245,12,32,158,8,162
·2310 DATA0,172,246,12,189,14,13,
145,47,200,232,236,238,12,208,24
4
·2320 DATA32,198,17,240,6,32,140,
9,76,136,18,76,125,11,201,77
·2330 DATA208,88,169,141,32,221,1
9,173,230,12,240,3,76,125,11,230
·2340 DATA47,208,2,230,48,165,47,
133,51,165,48,133,52,169,212,32
·2350 DATA221,19,173,230,12,208,2
29,165,47,133,53,165,48,133,54,1
69
·2360 DATA205,32,221,19,173,230,1
2,208,211,160,0,177,51,145,53,23
0
·2370 DATA53,208,2,230,54,230,51,
208,2,230,52,165,52,197,48,208
·2380 DATA232,165,51,197,47,208,2
26,76,125,11,76,235,19,32,42,17
·2390 DATA152,24,101,47,133,47,14
4,2,230,48,96,201,80,240,3,76
·2400 DATA148,20,169,144,32,42,17
,173,230,12,240,3,76,125,11,32
·2410 REM BLOCK 13 *****
·2420 DATA226,8,174,228,12,232,14
2,245,12,240,241,32,158,8,165,47
·2430 DATA133,51,165,48,133,52,16
9,208,32,42,17,173,230,12,208,22
0
·2440 DATA32,226,8,174,228,12,142
,232,12,32,158,8,165,47,133,53
·2450 DATA165,48,133,54,169,194,1
62,14,32,179,9,32,181,16,32,195
·2460 DATA16,169,243,162,14,32,17
9,9,32,36,16,240,7,162,1,142
·2470 DATA234,12,208,5,162,0,142,
234,12,169,162,162,15,32,179,9
·2480 DATA173,227,12,201,4,240,6,
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IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
32,154,23,76,132,20,169,1,174
•2490 DATA240,12,172,239,12,32,18
6,255,169,2,162,242,160,12,32,18
9
•2500 DATA255,32,192,255,169,1,14
1,250,12,173,234,12,240,3,76,68
•2510 DATA21,76,69,12,201,76,240,
3,76,135,11,169,182,162,14,32
•2520 DATA179,9,169,204,32,42,17,
240,12,169,113,162,15,32,179,9
•2530 DATA169,0,141,228,12,32,226
,8,174,228,12,32,158,8,32,171
•2540 DATA16,173,238,12,208,3,76,
125,11,32,181,16,174,241,12,160
•2550 DATA3,173,227,12,201,4,240,
3,76,208,23,169,1,32,186,255
•2560 DATA173,238,12,162,252,160,
12,32,189,255,32,192,255,32,83,1
7
•2570 DATA240,3,76,129,17,162,1,3
2,198,255,160,0,32,207,255,72
•2580 REM BLOCK 14 *****
•2590 DATA32,83,17,240,4,104,76,2
11,12,104,201,13,240,48,201,32
•2600 DATA144,234,174,244,12,240,
15,201,65,144,11,201,91,144,5,41
•2610 DATA223,76,38,21,9,128,201,
193,176,2,41,63,41,127,145,47
•2620 DATA200,204,221,12,208,198,
162,1,32,158,8,76,245,20,169,159
•2630 DATA145,47,208,242,162,0,14
2,246,12,142,233,12,142,231,12,2
32
•2640 DATA32,201,255,32,83,17,240
,3,76,129,17,160,0,177,51,201
•2650 DATA32,240,16,201,159,240,9
,200,204,235,12,208,240,76,81,22
•2660 DATA76,246,21,200,152,141,2
33,12,24,109,231,12,205,235,12,1
76
•2670 DATA106,160,0,177,51,32,35,
22,201,249,208,3,76,129,17,200
•2680 DATA204,233,12,208,238,24,1
73,231,12,109,233,12,141,231,12,
24
•2690 DATA165,51,109,233,12,133,5
1,144,2,230,52,24,173,246,12,109
•2700 DATA233,12,141,246,12,205,2
21,12,144,13,56,173,246,12,237,2
21
•2710 DATA12,141,246,12,238,245,1
2,173,245,12,205,232,12,208,3,76
•2720 DATA81,22,76,91,21,174,236,
12,169,13,32,210,255,173,251,12
•2730 DATA240,5,169,10,32,210,255
,202,208,238,96,169,0,141,231,12
•2740 DATA32,213,21,76,129,21,32,
213,21,56,173,221,12,237,246,12
•2750 REM BLOCK 15 *****
•2760 DATA24,101,51,133,51,144,2,
230,52,169,0,141,246,12,141,233
•2770 DATA12,174,245,12,232,142,2
45,12,236,232,12,240,3,76,91,21
•2780 DATA76,81,22,201,91,176,41,
201,65,144,5,9,128,76,54,22
•2790 DATA201,32,176,18,9,64,174,
244,12,240,11,201,96,144,5,41
•2800 DATA127,76,70,22,9,32,32,21
0,255,32,83,17,240,2,169,249
•2810 DATA96,32,96,17,76,125,11,2
01,6,208,25,24,173,219,12,105
•2820 DATA50,176,14,56,233,25,72,
32,55,9,104,141,219,12,32,61
•2830 DATA9,76,64,8,201,2,208,20,
56,173,219,12,233,25,144,241
•2840 DATA237,218,12,144,236,24,1
09,218,12,76,102,22,201,16,208,3
1
•2850 DATA24,173,217,12,105,5,205
,221,12,144,14,174,219,12,232,24
0
•2860 DATA208,56,237,221,12,168,7
6,118,8,141,217,12,76,64,8,201
•2870 DATA4,240,3,76,37,23,173,21
7,12,208,8,173,219,12,208,3
•2880 DATA76,64,8,32,55,9,32,226,
8,174,219,12,32,158,8,24
•2890 DATA165,47,109,217,12,133,4
7,144,2,230,48,56,165,47,233,1
•2900 DATA133,47,176,2,198,48,165
,47,133,51,165,48,133,52,32,226
•2910 DATA8,162,255,32,158,8,24,1
65,47,109,220,12,133,47,144,2
•2920 REM BLOCK 16 *****
•2930 DATA230,48,160,1,177,51,136
,145,51,230,51,208,2,230,52,165
•2940 DATA51,197,47,208,237,165,5
2,197,48,208,231,169,32,145,47,3
2
•2950 DATA61,9,76,160,10,201,9,24
0,3,76,64,8,174,219,12,232
•2960 DATA208,11,173,217,12,205,2
20,12,208,3,76,64,8,32,55,9
•2970 DATA32,226,8,174,219,12,32,
158,8,24,165,47,109,217,12,133
•2980 DATA47,144,2,230,48,165,47,
```

```
133,51,165,48,133,52,32,226,8
•2990 DATA162,255,32,158,8,24,165
,47,109,220,12,133,47,144,2,230
•3000 DATA48,56,165,47,233,1,133,
47,176,2,198,48,160,0,177,47
•3010 DATA200,145,47,165,47,197,5
1,208,232,165,48,197,52,208,226,
169
•3020 DATA32,136,145,47,32,61,9,7
6,64,8,174,240,12,134,212,172
•3030 DATA239,12,132,211,169,1,13
3,210,169,2,133,209,169,242,133,
218
•3040 DATA169,12,133,219,76,22,17
,24,173,196,255,105,56,141,203,2
3
•3050 DATA173,197,255,105,0,141,2
04,23,162,0,32,202,23,76,204,255
•3060 DATA169,1,134,212,132,211,1
33,210,173,238,12,133,209,169,25
2,133
•3070 DATA218,169,12,133,219,24,1
73,193,255,105,3,141,247,23,173,
194
•3080 DATA255,105,0,141,248,23,32
,125,11,76,237,20,109,83,8,141
•3090 REM LAST CHECKSUM ****
•3100 DATA 11372
•3110 REM RELOCATER/SAVER ****
•3120 DATA160,0,169,192,133,252,1
69,8,133,254,132,251,132,253,177
,251
•3130 DATA145,253,200,208,249,230
,252,166,254,232,134,254,224,24,
208,238
•3140 DATA169,8,170,160,255,32,18
6,255,173,59,3,162,60,160,3,32
•3150 DATA189,255,169,1,133,251,1
69,8,133,252,169,251,162,0,160,2
4
•3160 DATA32,216,255,169,0,133,45
,169,24,133,46,0
```

BUG REPELLENT LINE CODES FOR PTE

```
LINE # 10:DD
LINE # 15:FH
LINE # 20:KD
LINE # 30:KI
LINE # 40:ON
LINE # 50:EF
LINE # 60:NK
LINE # 70:MA
LINE # 80:LB
LINE # 85:MI
LINE # 90:DD
LINE # 100:DI
LINE # 110:JO
LINE # 120:AE
LINE # 130:HB
LINE # 140:IO
LINE # 150:FK
LINE # 160:AF
LINE # 170:PM
LINE # 180:IG
LINE # 190:GP
LINE # 200:CC
LINE # 210:EH
LINE # 220:LC
LINE # 230:GI
LINE # 240:CL
LINE # 250:GB
LINE # 260:DG
LINE # 270:KN
LINE # 280:DO
LINE # 290:HG
LINE # 300:DA
LINE # 310:DI
LINE # 320:BF
LINE # 330:MO
LINE # 340:BC
LINE # 350:IJ
LINE # 360:DA
LINE # 370:CA
LINE # 380:MA
LINE # 390:DI
LINE # 400:IM
LINE # 410:AG
LINE # 420:CE
LINE # 430:OB
LINE # 440:LK
LINE # 450:DM
LINE # 460:FN
LINE # 470:MD
LINE # 480:KG
LINE # 490:KN
LINE # 500:KH
LINE # 510:MM
LINE # 520:NF
LINE # 530:NI
LINE # 540:CN
LINE # 550:EI
LINE # 560:ME
LINE # 570:NK
LINE # 580:AF
LINE # 590:DL
LINE # 600:KA
LINE # 610:EF
LINE # 620:FO
LINE # 630:AG
LINE # 640:NO
LINE # 650:IE
LINE # 660:DL
LINE # 670:KC
LINE # 680:DA
LINE # 690:DA
LINE # 700:JD
LINE # 710:CG
LINE # 720:ID
LINE # 730:PJ
LINE # 740:OD
LINE # 750:NL
LINE # 760:DM
LINE # 770:GG
LINE # 780:KN
LINE # 790:GO
LINE # 800:HN
LINE # 810:FP
LINE # 820:FO
LINE # 830:PG
LINE # 840:GP
LINE # 850:PB
LINE # 860:DF
LINE # 870:JG
LINE # 880:CL
LINE # 890:MH
LINE # 900:OP
LINE # 910:BE
LINE # 920:IF
LINE # 930:PO
LINE # 940:LE
LINE # 950:CJ
LINE # 960:GI
LINE # 970:FC
LINE # 980:PJ
LINE # 990:IJ
LINE # 1000:PO
LINE # 1010:JL
LINE # 1020:LE
LINE # 1030:DK
LINE # 1040:MN
LINE # 1050:BM
LINE # 1060:LI
LINE # 1070:GC
LINE # 1080:DL
LINE # 1090:NH
LINE # 1100:LO
LINE # 1110:BO
LINE # 1120:JM
LINE # 1130:EH
LINE # 1140:JF
LINE # 1150:HH
LINE # 1160:AP
LINE # 1170:HL
LINE # 1180:OP
LINE # 1190:AH
LINE # 1200:BD
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 1205:FJ
LINE # 1206:GI
LINE # 1207:BC
LINE # 1208:CH
LINE # 1210:LH
LINE # 1211:KP
LINE # 1212:EP
LINE # 1213:LO
LINE # 1214:OD
LINE # 1220:BJ
LINE # 1230:OC
LINE # 1240:BC
LINE # 1250:EN
LINE # 1260:OB
LINE # 1270:FO
LINE # 1280:OP
LINE # 1290:FL
LINE # 1300:CD
LINE # 1310:HC
LINE # 1320:FE
LINE # 1330:DE
LINE # 1340:EK
LINE # 1350:NN
LINE # 1360:IE
LINE # 1370:PH
LINE # 1380:CG
LINE # 1390:BC
LINE # 1400:KG
LINE # 1410:MP
LINE # 1420:JD
LINE # 1430:HA
LINE # 1440:EO
LINE # 1450:GC
LINE # 1460:AC
LINE # 1470:FJ
LINE # 1480:KD
LINE # 1490:OC
LINE # 1500:GI
LINE # 1510:NI
LINE # 1520:ME
LINE # 1530:NJ
LINE # 1540:CN
LINE # 1550:BL
LINE # 1560:BH
LINE # 1570:JG
LINE # 1580:EM
LINE # 1590:PA
LINE # 1600:KE
LINE # 1610:IB
LINE # 1620:PG
LINE # 1630:NG
LINE # 1640:JJ
LINE # 1650:JI
LINE # 1660:EF
LINE # 1670:MJ
LINE # 1680:EO
LINE # 1690:NI
LINE # 1700:EN
LINE # 1710:CI
LINE # 1720:AJ
LINE # 1730:CI
LINE # 1740:PL
LINE # 1750:PJ
LINE # 1760:CO
LINE # 1770:GM
LINE # 1780:EE
LINE # 1790:NN
LINE # 1800:LD
LINE # 1810:EJ
LINE # 1820:NG
LINE # 1830:GO
LINE # 1840:NL
LINE # 1850:LO
LINE # 1860:KI
LINE # 1870:KJ
LINE # 1880:EG
LINE # 1890:IN
LINE # 1900:CN
LINE # 1910:FN
LINE # 1920:FL
LINE # 1930:HC
LINE # 1940:MN
LINE # 1950:IC
LINE # 1960:FC
LINE # 1970:CP
LINE # 1980:LD
LINE # 1990:DO
LINE # 2000:MF
LINE # 2010:MC
LINE # 2020:MI
LINE # 2030:DF
LINE # 2040:IJ
LINE # 2050:FP
LINE # 2060:HF
LINE # 2070:EA
LINE # 2080:EE
LINE # 2090:OE
LINE # 2100:AI
LINE # 2110:HJ
LINE # 2120:PI
LINE # 2130:AA
LINE # 2140:GA
LINE # 2150:OL
LINE # 2160:IF
LINE # 2170:LJ
LINE # 2180:DJ
LINE # 2190:BI
LINE # 2200:HP
LINE # 2210:DI
LINE # 2220:FJ
LINE # 2230:NL
LINE # 2240:FD
LINE # 2250:IA
LINE # 2260:AL
LINE # 2270:KP
LINE # 2280:DA
LINE # 2290:GJ
LINE # 2300:PM
LINE # 2310:LO
LINE # 2320:AE
LINE # 2330:II
LINE # 2340:CK
LINE # 2350:CE
LINE # 2360:JK
LINE # 2370:FI
LINE # 2380:MI
LINE # 2390:CO
LINE # 2400:IE
LINE # 2410:EG
LINE # 2420:OE
LINE # 2430:EO
LINE # 2440:GB
LINE # 2450:LB
LINE # 2460:AO
LINE # 2470:HL
LINE # 2480:IL
LINE # 2490:BJ
LINE # 2500:DF
LINE # 2510:HM
LINE # 2520:GG
LINE # 2530:PF
LINE # 2540:HL
LINE # 2550:MH
LINE # 2560:OI
LINE # 2570:AE
LINE # 2580:FJ
LINE # 2590:DM
LINE # 2600:ME
LINE # 2610:FD
LINE # 2620:DA
LINE # 2630:KA
LINE # 2640:PK
LINE # 2650:LK
LINE # 2660:NJ
LINE # 2670:AD
LINE # 2680:JP
LINE # 2690:IJ
LINE # 2700:MB
LINE # 2710:GP
LINE # 2720:GL
LINE # 2730:HF
LINE # 2740:BF
LINE # 2750:EM
LINE # 2760:MB
LINE # 2770:CH
LINE # 2780:KO
LINE # 2790:GL
LINE # 2800:GN
LINE # 2810:EF
LINE # 2820:GL
LINE # 2830:BD
LINE # 2840:KP
LINE # 2850:EP
LINE # 2860:CB
LINE # 2870:PO
LINE # 2880:KA
LINE # 2890:JA
LINE # 2900:FH
LINE # 2910:JM
LINE # 2920:EP
LINE # 2930:FD
LINE # 2940:AC
LINE # 2950:FE
LINE # 2960:FG
LINE # 2970:IB
LINE # 2980:KP
LINE # 2990:BO
LINE # 3000:BK
LINE # 3010:JE
LINE # 3020:CN
LINE # 3030:CI
LINE # 3040:LE
LINE # 3050:GF
LINE # 3060:DI
LINE # 3070:EH
LINE # 3080:MD
LINE # 3090:LA
LINE # 3100:IF
LINE # 3110:KL
LINE # 3120:NE
LINE # 3130:EM
LINE # 3140:BE
LINE # 3150:LB
LINE # 3160:ED
LINES: 326
```

ALTERNATE CHARACTER SET

FROM PAGE 60

PROGRAM 1

```
•10 GOTO 1000
•20 ******************************
•30 *  ALTERNATE CHARACTER SET   *
•40 *    FOR THE COMMODORE 64    *
•50 *  (C)1984 BY  M. KEVELSON   *
•60 *     BROOKLYN, NEW YORK     *
•70 ******************************
•1000 REM*SET BIT 0 & 1 OF PORT A
 TO OUT
•1100 POKE56578,PEEK(56578)OR3
•1200 REM*SET TO BANK 3 $C000 TO
$FFFF
•1300 POKE56576,(PEEK(56576)AND25
2)OR0
•1400 REM*SET SCREEN TO $C800
•1500 POKE53272,(PEEK(53272)AND15
)OR32
•1600 REM*SET CHARS TO $C000 TO $
C7FF
•1700 POKE53272,(PEEK(53272)AND24
0)
•1800 REM*TURN OFF KEYSCAN INTERR
UPT
•1900 POKE56334,PEEK(56344)AND254
•2000 REM*SWITCH IN CHARACTER SET
•2100 POKE1,PEEK(1)AND251
•2200 REM*MOVE UPPER/LOWER CASE T
O UPPER CASE/GRAPHICS
•2300 FORI=0TO1023
•2400 POKE49152+I,PEEK(55296+I)
•2500 NEXTI
•2600 REM*MOVE SHIFTED GRAPHICS
•2700 FORI=0TO263
•2800 POKE50176+I,PEEK(53760+I)
•2900 NEXTI
•2910 REM*REVERSE SPACE FOR BLINK
ING CURSOR
•2920 FORI=0TO7
•2930 POKE50432+I,255
•2940 NEXTI
•3000 REM*MOVE REVERSE CHARS FROM
 ! TO END
•3100 FORI=0TO759
•3200 POKE50440+I,PEEK(54536+I)
•3300 NEXTI
•3400 REM*RESTORE I/O
•3500 POKE1,PEEK(1)OR4
•3600 REM*RESTART INTERRUPTS
•3700 POKE56334,PEEK(56334)OR1
•3800 REM*SET SCREEN FOR OP SYSTE
M TO $C800
•3900 POKE648,200
```

PROGRAM 2

```
•1100 POKE56578,PEEK(56578)OR3
•1300 POKE56576,(PEEK(56576)AND25
2)OR0
•1400 REM*SET SCREEN TO $C000
•1500 POKE53272,(PEEK(53272)AND15
)
•1600 REM*SET CHARS TO $E000 TO $
E7FF
•1700 POKE53272,(PEEK(53272)AND24
0)OR8
•1900 POKE56334,PEEK(56344)AND254
•2100 POKE1,PEEK(1)AND251
•2300 FORI=0TO1023
•2400 POKE57344+I,PEEK(55296+I)
•2500 NEXTI
•2700 FORI=0TO263
•2800 POKE58368+I,PEEK(53760+I)
•2900 NEXTI
•2920 FORI=0TO7
•2930 POKE58624+I,255
•2940 NEXTI
•3100 FORI=0TO759
•3200 POKE58632+I,PEEK(54536+I)
•3300 NEXTI
•3500 POKE1,PEEK(1)OR4
•3700 POKE56334,PEEK(56334)OR1
•3800 REM*SET SCREEN FOR OP SYSTE
M TO $F000
•3900 POKE648,192
```

PROGRAM 3A

```
•10 REM*RESTORE ALTERNATE CHARACT
ERS
•20 REM*FOR USE WITH $C000 VERSIO
N
•1300 POKE56576,(PEEK(56576)AND25
2)
•1500 POKE53272,(PEEK(53272)AND15
)OR32
•1700 POKE53272,(PEEK(53272)AND24
0)
•3900 POKE648,200
```

PROGRAM 3B

```
•10 REM*RESTORE ALTERNATE CHARACT
ERS
```

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
20 REM*FOR USE WITH KERNAL VERSI
ON
1300 POKE56576,(PEEK(56576)AND25
2)OR0
1500 POKE53272,(PEEK(53272)AND15
)
1700 POKE53272,(PEEK(53272)AND24
0)OR8
3900 POKE648,192
```

BUG REPELLENT LINE CODES FOR ALTERNATE CHARACTER SET

PROGRAM 1

```
LINE # 10:FC      LINE # 2400:NL
LINE # 20:IK      LINE # 2500:MN
LINE # 30:PC      LINE # 2600:II
LINE # 40:NB      LINE # 2700:PM
LINE # 50:HM      LINE # 2800:LP
LINE # 60:BF      LINE # 2900:MN
LINE # 70:IK      LINE # 2910:HP
LINE # 1000:FM    LINE # 2920:JH
LINE # 1100:BN    LINE # 2930:IB
LINE # 1200:MC    LINE # 2940:MN
LINE # 1300:KI    LINE # 3000:LJ
LINE # 1400:NF    LINE # 3100:PK
LINE # 1500:ME    LINE # 3200:LJ
LINE # 1600:OA    LINE # 3300:MN
LINE # 1700:II    LINE # 3400:KP
LINE # 1800:PK    LINE # 3500:BE
LINE # 1900:FC    LINE # 3600:PD
LINE # 2000:MN    LINE # 3700:PD
LINE # 2100:IM    LINE # 3800:JK
LINE # 2200:AL    LINE # 3900:PG
LINE # 2300:CM    LINES: 41
```

PROGRAM 2

```
LINE # 1100:BN    LINE # 2900:MN
LINE # 1300:KI    LINE # 2920:JH
LINE # 1400:AN    LINE # 2930:HK
LINE # 1500:IL    LINE # 2940:MN
LINE # 1600:KM    LINE # 3100:PK
LINE # 1700:JN    LINE # 3200:PE
LINE # 1900:FC    LINE # 3300:MN
LINE # 2100:IM    LINE # 3500:BE
LINE # 2300:CM    LINE # 3700:PD
LINE # 2400:KP    LINE # 3800:MF
LINE # 2500:MN    LINE # 3900:PM
LINE # 2700:PM    LINES: 24
LINE # 2800:PK
```

PROGRAM 3A

```
LINE # 10:HI      LINE # 1300:LJ
LINE # 20:NB      LINE # 1500:ME
LINE # 1700:II    LINES: 6
LINE # 3900:PG
```

PROGRAM 3B

```
LINE # 10:HI      LINE # 1700:JN
LINE # 20:AG      LINE # 3900:PM
LINE # 1300:KI    LINES: 6
LINE # 1500:IL
```

RUPERT REPORT

FROM PAGE 64

LISTING 1

```
1 REM ----------------------
2 REM >> RUPERT REPORT 11 <<
3 REM >>     LISTING 1     <<
4 REM ----------------------
10 PRINT CHR$(147)
20 NR=5 : NC=8
30 DIM A$(NR,NC)
40 REM......FILL ARRAY.......
50 GOSUB 500
60 REM......PRINT ARRAY......
70 GOSUB 600
490 END
494 REM======================
495 REM <<<< FILL ARRAY >>>>
496 REM======================
500 L=65
510 FOR R=1 TO NR
520 : FOR C=1 TO NC
530 :    A$(R,C)=CHR$(L) : L=L+1
540 : NEXT C
550 NEXT R
560 RETURN
594 REM======================
595 REM <<<< PRINT ARRAY >>>>
596 REM======================
600 FOR R=1 TO NR
610 : FOR C=1 TO NC
620 :    PRINT A$(R,C);
630 : NEXT C
640 : PRINT
650 NEXT R
660 RETURN
```

LISTING 2

```
1 REM ----------------------
2 REM >> RUPERT REPORT 11 <<
3 REM >>     LISTING 2     <<
4 REM ----------------------
5 REM
```

```
·6 REM ..ADD THESE LINES TO
·7 REM ..LISTING 1........
·8 REM
·80 PRINT
·90 GOSUB 800
·794 REM=======================
·795 REM PRINT ARRAY VERTICALLY
·796 REM=======================
·800 FOR C=1 TO NC
·810 : FOR R=1 TO NR
·820 :   PRINT A$(R,C);
·830 : NEXT R
·840 : PRINT
·850 NEXT C
·860 RETURN
```

LISTING 3

```
·1 REM -----------------------
·2 REM >> RUPERT REPORT 11 <<
·3 REM >>     LISTING 3    <<
·4 REM -----------------------
·5 REM
·6 REM ---LETTER SEARCH---
·7 REM
·10 PRINT CHR$(147)
·20 NR=10: NC=10
·30 DIM A$(NR,NC)
·35 REM...INITIALIZE SOUND....
·40 GOSUB 2000
·45 REM......FILL ARRAY.......
·50 GOSUB 900
·60 REM......PRINT ARRAY......
·70 GOSUB 600
·80 REM......GET A LETTER.....
·90 GOSUB 300
·125 REM.....FIND LETTERS.....
·130 GOSUB 1000
·140 GOTO90
·294 REM=====================
·295 REM <<  GET A LETTER   >>
·296 REM=====================
·300 PRINT
·310 PRINT"CHOOSE A LETTER:  ";
·320 PRINT CHR$(20); : REM <DEL>
·330 GET L$ : IF L$="" THEN 330
·340 IF L$=CHR$(13) THEN 330
·350 PRINT L$
·360 GOSUB 2100 :REM..MAKE SOUND.
.
·370 RETURN
·594 REM=====================
·595 REM <<    PRINT ARRAY    >>
·596 REM=====================
·600 FOR R=1 TO NR
·610 FOR C=1 TO NC
·620 PRINT A$(R,C);
·630 NEXT C
·640 PRINT
·650 NEXT R
·660 RETURN
·894 REM=====================
·895 REM  RANDOMLY FILL ARRAY
·896 REM=====================
·900 FOR R=1 TO NR
·910 FOR C=1 TO NC
·920 A$(R,C)=CHR$(26*RND(0)+65)
·930 NEXT C
·940 NEXT R
·950 RETURN
·994 REM=====================
·995 REM <<  FIND A LETTER  >>
·996 REM=====================
·1000 PRINT CHR$(19) : REM HOME
·1010 FOR R=1 TO NR
·1020 FOR C=1 TO NC
·1030 IF A$(R,C)<>L$ THEN 1050
·1035 REM   18/146 = <RVS ON/OFF>
·1040 PRINT CHR$(18);
·1050 PRINT A$(R,C);CHR$(146);: N
EXT C
·1055 PRINT
·1060 NEXT R
·1070 RETURN
·1994 REM======================
·1995 REM << INITIALIZE SOUND >>
·1996 REM======================
·2000 FOR N=54272 TO 54296:POKEN,
0:NEXT
·2010 POKE 54296,15 :REM VOLUME
·2020 POKE 54277,68 :REM ADSR
·2030 POKE 54273,30:POKE 54272,75
 :REM PITCH
·2040 RETURN
·2094 REM================
·2095 REM << MAKE SOUND >>
·2096 REM================
·2100 POKE 54276,17
·2110 FOR T=1 TO 150 : NEXT
·2120 POKE 54276,16
·2130 RETURN
```

LISTING 4

```
·1 REM -----------------------
·2 REM >> RUPERT REPORT 11 <<
·3 REM >>     LISTING 4    <<
·4 REM -----------------------
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
•5 REM ....ADD THESE LINES
•6 REM ....TO LISTING 3
•7 REM
•8 REM   ---WORD SEARCH---
•9 REM
•65 PRINT CHR$(147) :REM <CLR>
•80 REM.....PICK A WORD........
•90 GOSUB 400
•125 REM.....FIND THE WORD....
•140 PRINT:PRINT:PRINT"PRESS <RET
 URN> TO REPEAT"
•145 PRINT"PRESS <DEL> KEY FOR NE
 W ARRAY[3"."]"
•150 GET Q$ : IF Q$="" THEN 150
•160 IF Q$=CHR$(13) THEN 60:REM <
 RETURN>
•170 IF Q$<>CHR$(20) THEN 150 :RE
 M <DEL>
•180 PRINT CHR$(147):GOTO 50 :REM
  ...GET NEW ARRAY
•394 REM======================
•395 REM <<    GET A WORD     >>
•396 REM======================
•400 PRINT:INPUT"WHAT WORD";W$
•410 L$=LEFT$(W$,1)
•420 RETURN
•1031 GOSUB 1100 : REM..FIND WORD
•1032 IF FLG=0 THEN 1050
•1033 GOSUB 2100 : GOSUB 2100
•1094 REM======================
•1095 REM <<   FIND A WORD     >>
•1096 REM======================
•1100 FLG=0
•1105 IF LEN(W$)=1 THEN FLG=1:RET
 URN
•1110 FOR D=1 TO 8
•1115 SR=R : SC=C
•1120 ON D GOSUB 1310,1320,1330,1
 340,1350,1360,1370,1380
•1130 FOR J=2 TO LEN(W$)
•1140 SR=SR+RI : SC=SC+CI
•1150 IF SR<1 OR SR>NR OR SC<1 OR
  SC>NC THEN 1190
•1160 IF MID$(W$,J,1)<>A$(SR,SC)T
 HEN 1190
•1170 NEXT J
•1180 FLG=1
•1190 NEXT D
•1200 RETURN
•1310 RI=-1 :CI= 0:RETURN :REM U
•1320 RI=-1 :CI= 1:RETURN :REM UR
•1330 RI= 0 :CI= 1:RETURN :REM R
•1340 RI= 1 :CI= 1:RETURN :REM DR
•1350 RI= 1 :CI= 0:RETURN :REM D
•1360 RI= 1 :CI=-1:RETURN :REM DL
•1370 RI= 0 :CI=-1:RETURN :REM L
•1380 RI=-1 :CI=-1:RETURN :REM UL
```

LISTING 5

```
•1 REM ----------------------
•2 REM >> RUPERT REPORT 11 <<
•3 REM >>     LISTING 5    <<
•4 REM ----------------------
•5 REM ....ADD THESE LINES
•6 REM ....TO LISTINGS 3 & 4
•7 REM
•8 REM ---REPEATED WORD SEARCH---
•9 REM
•41 GOTO 2200 :..REPEATED SEARCHE
 S
•1185 CT=CT+1 :REM...COUNT # FOUN
 D
•2194 REM=======================
 =
•2195 REM <<  REPEATED SEARCHES >
 >
•2196 REM=======================
 =
•2200 GOSUB 400 :REM...PICK WORD.
 .
•2210 PRINT CHR$(147) :REM <CLR>
•2220 GOSUB 900 :REM..FILL ARRAY.
 .
•2230 PRINT CHR$(19) :REM <HOME>.
 .
•2240 GOSUB 600 :REM.PRINT ARRAY.
 .
•2250 GOSUB 1000:REM...FIND WORD.
 .
•2260 NF=NF+CT : CT=0 :REM # FOUN
 D
•2270 NS=NS+1      :REM # SEARCHE
 S
•2280 PRINT:PRINT:PRINT"# SEARCHE
 S ="NS
•2290 PRINT"# FOUND ="NF
•2300 PRINT"SEARCH WORD IS "W$
•2310 GOTO 2220
```

LISTING 6

```
•5 NR=3 : NC=2
•10 DIM A1%(NR,NC)
•20 FOR R=0 TO NR : FOR C=0 TO NC
•30 A1%(R,C)=R+C+9 : NEXT C,R
•40 MEM=0 : M1=0 : M2=0
•50 M1=PEEK(47)+256*PEEK(48)
```

```
·60 M2=PEEK(49)+256*PEEK(50)
·70 FOR MEM=M1 TO M2-1
·80 PRINT PEEK(MEM); :NEXT
```

C-64 BUG REPELLENT LINE CODES FOR RUPERT REPORT

LISTING 1

```
LINE # 1:FM
LINE # 2:KG
LINE # 3:NG
LINE # 4:FM
LINE # 10:FG
LINE # 20:DM
LINE # 30:KJ
LINE # 40:HE
LINE # 50:CN
LINE # 60:DA
LINE # 70:CG
LINE # 490:IC
LINE # 494:PM
LINE # 495:DD
LINE # 496:PM
LINE # 500:GM
LINE # 510:PF
LINE # 520:CD
LINE # 530:DB
LINE # 540:AE
LINE # 550:NE
LINE # 560:IM
LINE # 594:PM
LINE # 595:IA
LINE # 596:PM
LINE # 600:PF
LINE # 610:CD
LINE # 620:KH
LINE # 630:AE
LINE # 640:NF
LINE # 650:NE
LINE # 660:IM
LINES: 32
```

LISTING 2

```
LINE # 1:FM
LINE # 2:KG
LINE # 3:NP
LINE # 4:FM
LINE # 5:JD
LINE # 6:DL
LINE # 7:LL
LINE # 8:JD
LINE # 80:JJ
LINE # 90:CI
LINE # 794:HL
LINE # 795:JE
LINE # 796:HL
LINE # 800:OP
LINE # 810:DP
LINE # 820:KH
LINE # 830:BF
LINE # 840:NF
LINE # 850:MH
LINE # 860:IM
LINES: 20
```

LISTING 3

```
LINE # 1:FM
LINE # 2:KG
LINE # 3:NI
LINE # 4:FM
LINE # 5:JD
LINE # 6:CI
LINE # 7:JD
LINE # 10:FG
LINE # 20:JK
LINE # 30:KJ
LINE # 35:HD
LINE # 40:FL
LINE # 45:HE
LINE # 50:DB
LINE # 60:DA
LINE # 70:CG
LINE # 80:DE
LINE # 90:CD
LINE # 125:EF
LINE # 130:FO
LINE # 140:PP
LINE # 294:PM
LINE # 295:JB
LINE # 296:PM
LINE # 300:JJ
LINE # 310:JG
LINE # 320:GA
LINE # 330:HL
LINE # 340:JC
LINE # 350:AI
LINE # 360:HN
LINE # 370:IM
LINE # 594:PM
LINE # 595:LA
LINE # 596:PM
LINE # 600:PF
LINE # 610:OP
LINE # 620:FL
LINE # 630:MH
LINE # 640:JJ
LINE # 650:NE
LINE # 660:IM
LINE # 894:PM
LINE # 895:KH
LINE # 896:PM
LINE # 900:PF
LINE # 910:OP
LINE # 920:IC
LINE # 930:MH
LINE # 940:NE
LINE # 950:IM
LINE # 994:PM
LINE # 995:LK
LINE # 996:PM
LINE # 1000:AM
LINE # 1010:PF
LINE # 1020:OP
LINE # 1030:HH
LINE # 1035:EK
LINE # 1040:FC
LINE # 1050:FB
LINE # 1055:JJ
LINE # 1060:NE
LINE # 1070:IM
LINE # 1994:CD
LINE # 1995:MH
LINE # 1996:CD
LINE # 2000:IA
LINE # 2010:NA
LINE # 2020:FA
LINE # 2030:NP
LINE # 2040:IM
LINE # 2094:KO
LINE # 2095:DE
LINE # 2096:KO
LINE # 2100:CJ
LINE # 2110:KG
LINE # 2120:CK
LINE # 2130:IM
LINES: 79
```

LISTING 4

```
LINE # 1:FM
LINE # 2:KG
LINE # 3:NJ
LINE # 4:FM
LINE # 5:BA
LINE # 6:EC
LINE # 7:JD
LINE # 8:FP
LINE # 9:JD
LINE # 65:JB
LINE # 80:PA
LINE # 90:CE
LINE # 125:HP
LINE # 140:MC
LINE # 145:KE
LINE # 150:JN
LINE # 160:AM
LINE # 170:CF
LINE # 180:CG
LINE # 394:CD
LINE # 395:PA
LINE # 396:CD
LINE # 400:OD
LINE # 410:CD
LINE # 420:IM
LINE # 1031:PJ
LINE # 1032:LG
LINE # 1033:ON
LINE # 1094:CD
LINE # 1095:DH
LINE # 1096:CD
LINE # 1100:LJ
LINE # 1105:FH
LINE # 1110:JE
LINE # 1115:JA
LINE # 1120:DA
LINE # 1130:AG
LINE # 1140:MF
LINE # 1150:AL
LINE # 1160:OF
LINE # 1170:MM
LINE # 1180:LI
LINE # 1190:MG
LINE # 1200:IM
LINE # 1310:NK
LINE # 1320:AF
LINE # 1330:BP
LINE # 1340:EP
LINE # 1350:AJ
LINE # 1360:PA
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 1370:MD
LINE # 1380:MB
LINES: 52
```

LISTING 5

```
LINE # 1:FM
LINE # 2:KG
LINE # 3:OC
LINE # 4:FM
LINE # 5:BA
LINE # 6:AA
LINE # 7:JD
LINE # 8:EJ
LINE # 9:JD
LINE # 41:LE
LINE # 1185:FF
LINE # 2194:JO
LINE # 2195:DN
LINE # 2196:JO
LINE # 2200:BC
LINE # 2210:JB
LINE # 2220:IK
LINE # 2230:OE
LINE # 2240:HF
LINE # 2250:HN
LINE # 2260:CG
LINE # 2270:NF
LINE # 2280:AO
LINE # 2290:LF
LINE # 2300:DA
LINE # 2310:EP
LINES: 26
```

LISTING 6

```
LINE # 5:DE
LINE # 10:NG
LINE # 20:AJ
LINE # 30:NN
LINE # 40:DP
LINE # 50:BM
LINE # 60:PC
LINE # 70:KM
LINE # 80:JO
LINES: 9
```

COMMODARES

FROM PAGE 64

BUG ELIMINATOR II

```
•5 REM  PROB. #11-3:
•6 REM BUG ELIMINATOR II
•10 PRINT CHR$(147)
•20 FOR L=1 TO RND(0)*1000
•30 PRINT ".*" CHR$(157);:NEXT
•40 PRINT CHR$(19)
•50 REM..YOUR PRGM. STARTS HERE
```

GRAPHIC RECTANGLE

```
•1 REM PROBLEM #6-4:
•2 REM GRAPHIC RECTANGLE
•3 REM ...SUGGESTED BY
•4 REM RAYMOND BOWEN....
•5 POKE 53281,11:PRINT CHR$(147)
•10 INPUT"HEIGHT";H:IFH<3 OR H>24
 THEN 10
•15 INPUT"WIDTH";W:IF W<3 OR W>39
  THEN 15
•20 S=INT(1024+((40-W)/2)+40*((24
 -H)/2))
•35 POKE53281,12
•40 FOR X=1TOW:POKEX+S+40,120:POK
 EX+S+(40*H),121:NEXT
•50 FORX=1TOH:POKES+(40*X),118:PO
 KES+(40*X)+W,97:NEXT
```

STRING CHALLENGE

```
•1 REM PROBLEM #6-3:
•2 REM STRING CHALLENGE
•3 REM ...SUGGESTED BY
•4 REM RAYMOND BOWEN...
•5 REM FIND STARTING POSITION OF
 A$ WITHIN B$
•10 INPUT A$,B$:GOSUB 20
•15 PRINT N:GOTO 10
•20 FOR N=1TO(LEN(B$)-LEN(A$)+1):
 IF MID$(B$,N,LEN(A$))=A$ THEN RE
 TURN
•30 NEXT:N=0:RETURN
```

UNSCRAMBLED WORD

```
•1 REM PROBLEM #7-2:
•2 REM UNSCRAMBLED WORD
•3 REM ...BY OSCAR GAUTHIER JR. A
 ND RON FONTAINE
•4 POKE 53281,0:POKE53280,6:PRINT
 "[WHITE]"
•5 P=0
•10 FOR I=49152 TO 49305
•20 READ J:POKE I,J
•30 P=P+J
•40 NEXT I
•50 IF P<>22643 THEN PRINT "ERROR
  IN DATA STATEMENTS":END
•51 PRINT "[CLEAR]"
•52 PRINT "[3"[DOWN]"]";TAB(11);"
 [RVSON]WORD DESCRAMBLER[RVSOFF]"
•53 PRINT "[6"[DOWN]"]";TAB(18);"
 BY"
•54 PRINT "[3"[DOWN]"]";TAB(11);"
 OSCAR GAUTHIER JR."
•55 PRINT "[5"[DOWN]"]";TAB(6);"P
 RESS 'RETURN' TO CONTINUE"
•56 GET R$:IFR$=""THEN56
•57 PRINT "[CLEAR]"
•58 PRINT " [RVSON]PRESS 'RETURN'
  TO CONTINUE DISPLAY"
•59 PRINT "[DOWN] [RVSON]PRESS 'E
 ' TO END DISPLAY[DOWN]"
•69 PRINT "[DOWN] (ONLY 2 TO 39 L
 ETTERS ALLOWED)"
•70 INPUT " ENTER NUMBER OF LETTE
 RS";X
•71 IF X<2 OR X>39 THEN 70
•73 IF X>33 THEN PRINT "[DOWN] TO
 O MANY POSSIBILIES TO CALCULATE"
```

```
:GOTO78
·76 P=1:FORG=1TOX-1:P=P+(P*G):NEX
T:PRINT "[DOWN] THERE ARE"P"COMB
INATIONS
·78 PRINT "[DOWN] SEE ALL THE LET
TERS (Y OR N) [RVSON] [RVSOFF][
LEFT]";
·80 GET R$:IFR$=""THEN80
·83 PRINTR$:IF R$="Y"THENPOKE4924
1,0:GOTO90
·84 INPUT "[DOWN] HOW MANY LETTER
S";R
·86 IF X-R<0THEN PRINT"[DOWN] NO
MORE THAN";X;"LETTERS":GOTO84
·87 IF R<=1THENPRINT"[DOWN] NOT L
ESS THAN 2 LETTERS":GOTO84
·89 POKE 49241,X-R
·90 POKE 50000,X
·100 POKE 50001,X-1
·110 POKE 50002,X+1
·115 PRINT "[DOWN]";
·120 FOR I=1 TO X
·130 POKE 51000+I,I
·140 PRINT " ENTER LETTER #";I;"
[RVSON] [RVSOFF][LEFT]";
·150 GET X$:IFX$=""THEN 150
·155 PRINT X$
·160 POKE 52000+I,ASC(X$)
·170 NEXT I
·175 CLR
·180 PRINT "[CLEAR]";
·190 SYS 49152
·200 PRINT "[DOWN][DOWN][6" "]DO
ANOTHER WORD (Y OR N)?"
·210 GET R$:IFR$=""THEN210
·220 IF R$="Y"THEN 57
·230 END
·49152 DATA 169,0,141,83,195
·49157 DATA 174,80,195,189,56
·49162 DATA 199,172,81,195,217
·49167 DATA 56,199,240,19,136
·49172 DATA 192,0,208,246,202
·49177 DATA 224,1,240,52,138
·49182 DATA 168,136,189,56,199
·49187 DATA 76,14,192,254,56
·49192 DATA 199,189,56,199,205
·49197 DATA 82,195,208,212,202
·49202 DATA 224,0,240,94,254
·49207 DATA 56,199,189,56,199
·49212 DATA 205,82,195,240,240
·49217 DATA 138,168,169,1,200
·49222 DATA 204,82,195,240,186
·49227 DATA 153,56,199,76,69
·49232 DATA 192,173,83,195,201
·49237 DATA 24,240,34,160,34
·49242 DATA 200,204,82,195,240
·49247 DATA 12,190,56,199,189
·49252 DATA 32,203,32,210,255
·49257 DATA 76,90,192,169,13
·49262 DATA 32,210,255,174,80
·49267 DATA 195,238,83,195,76
·49272 DATA 38,192,169,0,32
·49277 DATA 228,255,240,251,201
·49282 DATA 69,208,1,96,169
·49287 DATA 147,32,210,255,169
·49292 DATA 0,141,83,195,76
·49297 DATA 88,192,96,32,228
·49302 DATA 255,240,251,96
```

C-64 BUG REPELLENT LINE CODES FOR COMMODARES

BUG ELIMINATOR II

LINE # 5:PM	LINE # 30:OP
LINE # 6:OO	LINE # 40:CH
LINE # 10:FG	LINE # 50:JP
LINE # 20:AB	LINES: 7

GRAPHIC RECTANGLE

LINE # 1:LK	LINE # 15:DN
LINE # 2:EC	LINE # 20:CF
LINE # 3:GK	LINE # 35:ED
LINE # 4:AO	LINE # 40:JM
LINE # 5:ON	LINE # 50:IL
LINE # 10:GG	LINES: 11

STRING CHALLENGE

LINE # 1:LL	LINE # 10:KP
LINE # 2:AI	LINE # 15:BH
LINE # 3:GK	LINE # 20:EO
LINE # 4:MP	LINE # 30:LD
LINE # 5:FM	LINES: 9

UNSCRAMBLED WORD

LINE # 0:ME	LINE # 53:PA
LINE # 1:JN	LINE # 54:LH
LINE # 2:CC	LINE # 55:EP
LINE # 3:AG	LINE # 56:EO
LINE # 4:EK	LINE # 57:HH
LINE # 5:DF	LINE # 58:MJ
LINE # 10:FE	LINE # 59:HK
LINE # 20:HI	LINE # 69:DH
LINE # 30:EA	LINE # 70:LH
LINE # 40:MN	LINE # 71:OC
LINE # 50:LD	LINE # 73:DI
LINE # 51:HH	LINE # 76:HN
LINE # 52:FI	LINE # 78:NJ

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 80:HC
LINE # 83:MC
LINE # 84:MF
LINE # 86:NL
LINE # 87:LH
LINE # 89:CA
LINE # 90:DP
LINE # 100:AB
LINE # 110:AB
LINE # 115:EP
LINE # 120:BC
LINE # 130:CB
LINE # 140:PF
LINE # 150:OK
LINE # 155:DH
LINE # 160:HM
LINE # 170:ON
LINE # 175:JO
LINE # 180:NK
LINE # 190:MJ
LINE # 200:BM
LINE # 210:LG
LINE # 220:IM
LINE # 230:IC
LINE # 49152:OI
LINE # 49157:CN
LINE # 49162:GI
LINE # 49167:MD
LINE # 49172:NL
LINE # 49177:IE
LINE # 49182:IA
LINE # 49187:OE
LINE # 49192:IN
LINE # 49197:NP
LINE # 49202:OK
LINE # 49207:ND
LINE # 49212:DJ
LINE # 49217:NN
LINE # 49222:AL
LINE # 49227:BH
LINE # 49232:NN
LINE # 49237:OP
LINE # 49242:GO
LINE # 49247:DO
LINE # 49252:CL
LINE # 49257:LI
LINE # 49262:LN
LINE # 49267:CG
LINE # 49272:OO
LINE # 49277:LF
LINE # 49282:KB
LINE # 49287:AD
LINE # 49292:JD
LINE # 49297:OO
LINE # 49302:HC
LINES: 81
```

TUNNEL OF TOMACHON

FROM PAGE 49

PART 1

```
·10 PRINT"[HOME]":POKE36879,104:P
 OKE52,28:POKE56,28:CLR
·20 FORI=7424TO7679:POKEI,PEEK(I+
 25600):NEXT
·25 FORI=7179TO7408:READJ:POKEI,J
 :NEXTI
·30 FORI=7432TO7551:READJ:POKEI,J
 :NEXTI
·40 FORI=7632TO7679:READJ:POKEI,J
 :NEXTI
·50 FORI=7416TO7423:READJ:POKEI,J
 :NEXTI
·1000 DATA8,72,138,72,152,72,162,
 1,160,0,189,0,30,201,39,208,46,1
 38
·1010 DATA72,56,233,23,170,189,0,
 30,201,32,240,13,169,58,157,0,30
·1020 DATA169,2,157,0,150,76,64,2
 8,169,39,157,0,30,169,10,157,0,1
 50,104
·1030 DATA170,169,32,157,0,30,76,
 150,28,201,35,208,22,32,132,3,16
 5,98
·1040 DATA201,157,176,63,169,39,1
 57,0,30,169,10,157,0,150,76,150,
 28,201,40
·1050 DATA208,8,169,32,157,0,30,7
 6,150,28,201,37,208,25,189,0,150
 ,41,15,201,10
·1060 DATA208,8,169,9,157,0,150,7
 6,150,28,169,10,157,0,150,76,150
 ,28,201,58,208,5
·1070 DATA169,32,157,0,30,189,0,3
 0,72,189,0,150,41,15,202,157,0,1
 50
·1080 DATA104,157,0,30,232,232,20
 0,192,21,208,61,232,224,242,144,
 59
·1090 DATA162,0,189,0,30,201,36,2
 08,35,32,132,3,165,98,201,160
·1100 DATA176,26,138,24,105,22,16
 8,185,0,30,201,41,240,14,169,40
·1110 DATA153,0,30,169,2,153,0,16
 0,152,76,198,28,232,224,220,144,
 209
·1120 DATA104,168,104,170,104,40,
 96,76,21,28,76,19,28
·2000 DATA255,255,255,255,255,255
 ,255,255,60,66,153,153,66,60,90,
 153
·2010 DATA8,8,28,28,28,28,62,62,2
 55,165,90,36,24,24,24,24
·2020 DATA255,235,235,235,235,235
 ,235,255,0,64,64,96,124,254,127,
 0
·2030 DATA12,12,12,12,63,8,8,8,24
 ,24,24,24,24,24,24,24
·2040 DATA24,24,24,24,36,90,165,2
 55,255,254,252,252,240,240,192,1
 28
·2050 DATA255,127,31,63,63,15,7,1
 ,1,3,15,31,31,63,127,255
·2060 DATA128,224,224,248,248,252
 ,248,255,66,66,66,36,36,24,24,0
·2070 DATA0,0,0,48,191,48,0,0,73,
 107,186,28,255,28,171,105
·2080 DATA60,66,64,60,2,66,60,0,2
 8,34,64,64,64,34,28,0
·2090 DATA24,36,66,66,66,36,24,0,
 1,124,66,66,124,72,68,66,00
```

```
•2100 DATA126,64,64,120,64,64,126
,0
•3000 DATA64,64,64,64,64,64,126,0
•5000 PRINT"[13"[DOWN]"][BLACK][3
" "]NOW LOADING MAIN[7" "]PROGRA
M"
•5010 PRINT"[BLUE][HOME]":POKE198
,5:POKE631,78:POKE632,69:POKE633
,37:POKE634,17:POKE635,131:END
```

PART 2

```
•5 PRINT"[CLEAR]"
•10 LO=7680:CO=30720:L=0:H=3:N=4
•15 FORI=900TO915:READJ:POKEI,J:N
EXTI
•20 POKE36869,255:POKE251,0:POKE2
52,0:POKE253,0:POKE36878,96:GOTO
5000
•50 IFP<>150THENGOSUB3000:GOTO55
•52 FORI=7701TO7921STEP22:POKEI,3
3:POKEI+CO,5:NEXT:POKE7833,32:FO
RJ=1TO50:NEXT
•54 L=L+1:P=0:PRINT"[HOME][14"[DO
WN]"[19"[RIGHT]"][WHITE]";L:H=H-
1:IFH<1THENH=4
•55 POKE37154,127:D=(PEEK(37137)A
ND28)OR(PEEK(37152)AND128)
•60 F=(PEEK(37137)AND32)/32:P=P+1
•70 IFD=156THEN150
•80 IFD=28THENX1=X1+1:Y1=Y
•90 IFD=152THENY1=Y1-1:X1=X
•100 IFD=148THENY1=Y1+1:X1=X
•110 IFD=140THENX1=X1-1:Y1=Y
•120 IFD=24THENX1=X1+1:Y1=Y1-1
•130 IFD=20THENX1=X1+1:Y1=Y1+1
•140 IFX1<0ORX1>21THENX1=X
•150 POKELO+X+Y*22,32:POKEB,32:SY
S7179:POKE36876,0:IFPEEK(LO+X1+Y
1*22)<>32THEN250
•160 X=X1:Y=Y1:POKELO+X+Y*22,38:P
OKELO+X+Y*22+CO,1
•170 IFE<>0ANDB=0THEN240
•180 IFF=0ANDB=0THENB=LO+X+(Y+1)*
22:S=235:POKE36876,S:GOTO200
•190 B=B+22
•200 IFPEEK(B)=39THENSC=SC+40
•210 IFPEEK(B)<>32ANDPEEK(B)<42TH
ENSC=SC+10:S=0:POKE36876,S
•215 IFPEEK(B)=41THENPOKEB-110,58
:POKEB-110+CO,2
•220 IFPEEK(B)<>32THENPOKEB,58:B=
0:S=0:POKE36876,B:GOTO240
•230 POKEB,47:POKEB+CO,2:S=S-10:P
OKE36876,S
•240 PRINT"[HOME][RED][20"[DOWN]"
]";TAB(8);SC:GOTO50
•250 POKELO+X+Y*22,58:POKELO+CO+X
+Y*22,2
•260 FORI=15TO0STEP-1:FORJ=15TO0S
TEP-1:POKE36878,96+I:POKE36877,2
00
•265 POKE36879,8+I*J:NEXTJ,I
•270 N=N-1:L=L-1:IFN=-2THENPRINT"
[HOME][WHITE]FINAL SCORE"SC:POKE
36869,240:END
•280 GOTO5000
•3000 C=C+1:IFC>HTHENC=0:A=INT(RN
D(1)*4)+34:GOTO3020
•3010 A=-1
•3020 IFW=42ANDV=3THENW=43:GOTO30
80
•3030 IFW=43ANDV=0THENW=42:GOTO30
80
•3040 IFRND(1)<.7ANDW=42THENV=V+1
:GOTO3080
•3050 IFRND(1)<.7ANDW=43THENV=V-1
:GOTO3080
•3060 IFW=42THENW=43:GOTO3080
•3070 W=42
•3080 FORI=0TO10:J=22*I+7701:IFI<
VORI>V+7THENPOKEJ,33:POKEJ+CO,5
•3090 IFI=VTHENPOKEJ,W:POKEJ+CO,5
•3100 IFI=V+7THENPOKEJ,W+2:POKEJ+
CO,5
•3110 IFI>VANDI<V+7THENPOKEJ,32
•3120 NEXTI
•3130 IFA=34THENPOKE(V+6)*22+7701
,A:POKE(V+6)*22+7701+CO,7
•3140 IFA=35THENPOKE(V+6)*22+7701
,A:POKE(V+6)*22+7701+CO,6
•3150 IFA=36THENPOKE(V+1)*22+7701
,A:POKE(V+1)*22+7701+CO,4
•3155 IFA=36THENPOKE(V+6)*22+7701
,A+5:POKE(V+6)*22+7701+CO,4
•3160 IFA=37THENI=(V+INT(RND(1)*3
+1))*22+7701:POKEI,A:POKEI+CO,9
•3170 RETURN
•5000 POKE36879,13:PRINT"[HOME]":
C=0:B=0:X=0:Y=6:X1=0:Y1=6:P=0
•5010 FORI=7922TO7965:POKEI,33:PO
KEI+CO,5:NEXTI
•5020 L=L+1:PRINT"[EP][WHITE][14"
[DOWN]"]";TAB(14);"[BACKARROW]?.
?[BACKARROW]"L
•5040 PRINTTAB(7);"[DOWN][DOWN];<
=>?[DOWN][DOWN][4"[LEFT]"]"SC
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
·5044 FORI=7988TO7988+N:IFN<0THEN
5050
·5046 POKEI,38:POKEI+CO,1:NEXTI
·5050 V=INT(RND(1)*3):W=42:FORQ=1
TO20:GOSUB3000:SYS7179:NEXTQ
·5060 FORI=7900TO7812STEP-22:POKE
I,38:POKEI+CO,1:FORJ=1TO500:NEXT
J:POKEI,32:NEXTI
·5070 POKE36877,250:POKE36878,106
:GOTO50
·6000 DATA8,72,138,72,152,72,32,1
55,224,104,168,104,170,104,40,96
```

BUG REPELLENT LINE CODES FOR TUNNEL OF TOMACHON

PART 1

```
LINE # 10:IN       LINE # 1110:NM
LINE # 20:KI       LINE # 1120:JO
LINE # 25:IC       LINE # 2000:AE
LINE # 30:KH       LINE # 2010:HG
LINE # 40:IG       LINE # 2020:EK
LINE # 50:HH       LINE # 2030:OM
LINE # 1000:JP     LINE # 2040:HN
LINE # 1010:ED     LINE # 2050:EJ
LINE # 1020:NA     LINE # 2060:HM
LINE # 1030:DM     LINE # 2070:LG
LINE # 1040:II     LINE # 2080:PF
LINE # 1050:DC     LINE # 2090:DE
LINE # 1060:IJ     LINE # 2100:OE
LINE # 1070:EK     LINE # 3000:PN
LINE # 1080:PM     LINE # 5000:EN
LINE # 1090:HG     LINE # 5010:LM
LINE # 1100:NB     LINES: 33
```

PART 2

```
LINE # 5:HH        LINE # 160:PD
LINE # 10:EK       LINE # 170:IC
LINE # 15:DI       LINE # 180:CA
LINE # 20:FK       LINE # 190:EI
LINE # 50:AB       LINE # 200:MB
LINE # 52:KA       LINE # 210:IC
LINE # 54:AL       LINE # 215:CF
LINE # 55:OJ       LINE # 220:IH
LINE # 60:CJ       LINE # 230:GL
LINE # 70:FA       LINE # 240:DD
LINE # 80:DA       LINE # 250:HD
LINE # 90:DI       LINE # 260:IF
LINE # 100:DM      LINE # 265:GI
LINE # 110:BJ      LINE # 270:KG
LINE # 120:CH      LINE # 280:FO
LINE # 130:CM      LINE # 3000:LM
LINE # 140:JF      LINE # 3010:NE
LINE # 150:JG      LINE # 3020:HK
LINE # 3030:GD     LINE # 3160:AG
LINE # 3040:PO     LINE # 3170:IM
LINE # 3050:PO     LINE # 5000:AH
LINE # 3060:IC     LINE # 5010:IF
LINE # 3070:HC     LINE # 5020:GI
LINE # 3080:JM     LINE # 5040:NO
LINE # 3090:JN     LINE # 5044:HK
LINE # 3100:HM     LINE # 5046:EG
LINE # 3110:LN     LINE # 5050:DM
LINE # 3120:MN     LINE # 5060:NE
LINE # 3130:PG     LINE # 5070:GB
LINE # 3140:BA     LINE # 6000:KI
LINE # 3150:PH     LINES: 62
LINE # 3155:AJ
```

BLOCK EDITOR

FROM PAGE 57

```
·5 POKE53280,2:POKE53281,1:POKE64
6,0
·10 DIMA$(256),B$(256),C$(256):PR
INT"[CLEAR]":GOSUB600:F=5:R=16:J
=212:K=0:L=1:M=15
·15 DEF FNA(Y)=Y*R+Z
·20 CLOSE15:PRINT"ENTER TRACK, SE
CTOR"
·30 INPUTT,S:GOSUB100:IFA<>0THENP
RINTA,B$,C,D:CLOSE5:GOTO20
·35 GOSUB200
·40 PRINT"[HOME][12"[RIGHT]"[3"[D
OWN]"]";
·50 GOTO400
·99 STOP
·100 REM *** READ BLOCK ***
·110 OPEN15,8,15
·120 OPEN5,8,5,"#"
·130 PRINT#15,"U1:"5;0;T;S
·135 INPUT#15,A,B$,C,D:IFA<>0THEN
RETURN
·140 FORX=KTO255
·150 GET#F,A$(X)
·155 C$(X)=B$(ASC(A$(X)+CHR$(K)))
:NEXT
·170 CLOSE5:CLOSE15:RETURN
·200 REM *** DISPLAY T & S ***
·210 PRINT"[CLEAR][26" "]"T"/"S
·220 PRINT"[5"[DOWN]"]"
·230 PRINT"F1=CHANGE"
·231 PRINT"[3" "]BYTE[DOWN]"
·232 PRINT"F3=SAVE"
·233 PRINT"[3" "]BLOCK[DOWN]"
·234 PRINT"F5=LOAD"
·235 PRINT"[3" "]BLOCK[DOWN]"
```

```
·236 PRINT"F7=EXIT"
·237 PRINT"[3" "]PROGRAM"
·238 PRINT"[HOME][3"[DOWN]"]"
·240 FORY=KTOM
·250 PRINT"[15"[RIGHT]"]";
·260 FORZ=KTOM
·270 POKEJ,K
·280 PRINT"[RVSON]";:POKEJ,L
·300 PRINTC$(FNA(Y));
·310 NEXT
·315 PRINT
·320 NEXT:RETURN
·400 A=0:B=0
·405 C=A+B*16
·408 PRINT"[RVSON][HOME]VALUE [5"
 ="]> ";ASC(C$(C));"[LEFT][3" "]"
·410 PRINT"[RVSON]POSITION ==> ";
 C;"[LEFT][3" "]":GOSUB500
·411 POKEJ,K:PRINT"[RVSOFF]";:POK
 EJ,L:PRINT" ";:POKEJ,K:PRINT"[LE
 FT]";
·412 GETA$:IFA$="[DOWN]"THENB=B-(
 B<15):POKE54296,15
·413 IFA$="[UP]"THENB=B+(B>0):POK
 E54296,15
·414 IFA$="[RIGHT]"THENA=A-(A<15)
 :POKE54296,15
·415 IFA$="[LEFT]"THENA=A+(A>0):P
 OKE54296,15
·416 IFA$="[F1]"THEN700
·417 POKE54296,0:POKEJ,K:PRINT"[R
 VSON]";:POKEJ,L:PRINTC$(C);:POKE
 J,K:PRINT"[LEFT]";
·418 IFA$="[F3]"THENGOSUB800:IFJ$
 ="Y"THEN850
·419 IFA$="[F7]"THENGOSUB805:IFJ$
 ="Y"THEN990
·420 IFA$="[F5]"THENGOSUB802:IFJ$
 ="Y"THENPRINT"[CLEAR]":GOTO20
·421 IFA$="[HOME]"THENA=0:B=0
·422 IFA$="+"ORA$="-"THEN1000
·424 GOTO405
·425 STOP
·450 POKE54296,15:IFB>15THENB=15
·460 POKE54296,15:IFB<0THENB=0
·500 PRINT"[HOME]";
·510 FORX=1TOA+15:PRINT"[RIGHT]";
 :NEXT:FORX=1TOB+4:PRINT"[DOWN]";
 :NEXT:RETURN
·600 FORX=0TO255
·610 B$(X)=CHR$(X)
·620 NEXT
·630 B$(13)="M"
·640 B$(20)="T"
·650 RETURN
·700 PRINT"[HOME][22"[DOWN]"[7"[R
IGHT]"]ENTER NEW VALUE: ";:V=ASC
(C$(C)):GOSUB900
·710 A$(C)=CHR$(I):C$(C)=B$(I):GO
SUB500:GOTO418
·800 PRINT"[HOME][22"[DOWN]"[3"[R
IGHT]"]SAVE BLOCK -- ARE YOU SUR
E (Y/N)? ";:GOTO810
·802 PRINT"[HOME][22"[DOWN]"[3"[R
IGHT]"]LOAD BLOCK -- ARE YOU SUR
E (Y/N)? ";:GOTO810
·805 PRINT"[HOME][22"[DOWN]"]EXIT
 PROGRAM -- ARE YOU SURE (Y/N)?
 ";
·810 GOSUB1600
·811 GETJ$:IFJ$="Y"THENPRINT"YES"
 :RETURN
·820 IFJ$<>"N"THEN811
·830 PRINT"NO";:FORX=1TO1000:NEXT
 :FORX=1TO50:PRINTCHR$(20);:NEXT:
RETURN
·850 OPEN15,8,15
·860 OPEN5,8,5,"#"
·865 PRINT#15,"B-P:"5,0
·870 FORX=KTO255
·875 PRINT#5,C$(X);
·880 NEXT
·885 PRINT#15,"U2:"5;0;T;S
·890 CLOSE5:CLOSE15
·895 PRINT"[CLEAR]":GOTO20
·900 I$=""
·905 PRINT"[c @][LEFT]";:GETJ$:IF
J$=""THEN905
·910 IFJ$=CHR$(20)ANDI$=""THEN905
·915 IFLEN(I$)=3ANDJ$<>CHR$(13)AN
DJ$<>CHR$(20)THEN905
·920 PRINTJ$;:IFJ$=CHR$(20)THENI$
=LEFT$(I$,LEN(I$)-1):GOTO905
·925 IFJ$=CHR$(13)THEN950
·930 I$=I$+J$:GOTO905
·950 FORX=1TO50:PRINTCHR$(20);:NE
XT
·955 I=VAL(I$):IFI$=""THENI=V
·960 RETURN
·990 END
·1000 IFA$="-"THEN1500
·1010 S=S+1:IFT<18ANDS=21THENS=0:
GOTO1200
·1020 IFT<25ANDS=19THENS=0:GOTO12
00
·1030 IFT<31ANDS=18THENS=0:GOTO12
```

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
00
·1040 IFT<36ANDS=17THENS=0:GOTO12
00
·1050 GOTO1499
·1200 T=T+1:IFT=36THENT=1
·1499 PRINT"[RVSOFF]";:GOSUB100:G
OSUB200:GOTO40
·1500 S=S-1:IFS>-1THEN1499
·1510 T=T-1:IFT<1THENT=35
·1520 IFT<18THENS=20:GOTO1499
·1530 IFT<25THENS=18:GOTO1499
·1540 IFT<31THENS=17:GOTO1499
·1550 IFT<36THENS=16
·1560 GOTO1499
·1600 FORX=1TO10:POKE54296,15:POK
E54296,0:NEXT:RETURN
·1610 POKE54272,
```

BUG REPELLENT LINE CODES FOR BLOCK EDITOR

```
LINE # 5:CA
LINE # 10:LP
LINE # 15:EA
LINE # 20:CI
LINE # 30:DH
LINE # 35:CC
LINE # 40:JP
LINE # 50:CA
LINE # 99:JC
LINE # 100:ON
LINE # 110:AM
LINE # 120:DA
LINE # 130:AM
LINE # 135:PK
LINE # 140:BN
LINE # 150:FE
LINE # 155:JF
LINE # 170:NI
LINE # 200:GC
LINE # 210:EP
LINE # 220:CM
LINE # 230:FA
LINE # 231:IJ
LINE # 232:MK
LINE # 233:ME
LINE # 234:MP
LINE # 235:ME
LINE # 236:OP
LINE # 237:FE
LINE # 238:CG
LINE # 240:MI
LINE # 250:PF
LINE # 260:ND
LINE # 270:FN
LINE # 280:MM
LINE # 300:DP
LINE # 310:IA
LINE # 315:JJ
LINE # 320:EJ
LINE # 400:JI
LINE # 405:FE
LINE # 408:JM
LINE # 410:IN
LINE # 411:GE
LINE # 412:FE
LINE # 413:ME
LINE # 414:IF
LINE # 415:EN
LINE # 416:LA
LINE # 417:NE
LINE # 418:GP
LINE # 419:CF
LINE # 420:AB
LINE # 421:FN
LINE # 422:AK
LINE # 424:CH
LINE # 425:JC
LINE # 450:BN
LINE # 460:OK
LINE # 500:CE
LINE # 510:JE
LINE # 600:AM
LINE # 610:CB
LINE # 620:IA
LINE # 630:FE
LINE # 640:FF
LINE # 650:IM
LINE # 700:AM
LINE # 710:CA
LINE # 800:NC
LINE # 802:MF
LINE # 805:DO
LINE # 810:FM
LINE # 811:CH
LINE # 820:BL
LINE # 830:KD
LINE # 850:AM
LINE # 860:DA
LINE # 865:OO
LINE # 870:BN
LINE # 875:EE
LINE # 880:IA
LINE # 885:AJ
LINE # 890:BF
LINE # 895:JA
LINE # 900:HD
LINE # 905:DA
LINE # 910:MB
LINE # 915:PP
LINE # 920:JG
LINE # 925:IA
LINE # 930:CN
LINE # 950:CJ
LINE # 955:JO
LINE # 960:IM
LINE # 990:IC
LINE # 1000:ID
LINE # 1010:GN
LINE # 1020:DK
LINE # 1030:IA
LINE # 1040:MK
LINE # 1050:GM
LINE # 1200:FI
LINE # 1499:KD
LINE # 1500:GI
LINE # 1510:EN
LINE # 1520:IO
LINE # 1530:OF
LINE # 1540:MD
LINE # 1550:CA
LINE # 1560:GM
LINE # 1600:GB
LINE # 1610:NM
LINES: 113
```

REVIEWS

Continued from page 40

levels. You will also find potions to restore your hit points, sacks that let you carry more gold, and beacons that can magically transport you to a temple.

Sword of Fargoal is a nearly addictive game, but it is so short on options that I often talk myself out of playing. Although the game takes several hours, there is no save game feature. For that matter, there isn't even a pause feature. Sorry, Epyx, but after a couple hours, I need a break. Only one person can play. Although each level is randomly generated for each game, you must always start at level 1.

If options are in short supply, it is no shorter than the information you have as a player. The level you're on and the spells you have are only displayed between levels. And you'll spend a lot of time waiting for your hit points to build back up while you rest at the temples. But this slowness isn't complemented by an adventure game aspect. You won't need to draw a map because when you ascend through the dungeon, the levels will all be different from your descent. There are no clues to find, no mysteries to unravel. This game is so close to its goal, and yet so far.

Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089 (phone: 408-745-0700). *—Richard Herring*

QUICKWRITER III
Educomp
Commodore 64
Disk, cassette; $19.95

To this day, word processing on mainframes is often called text editing. Why a different term? Because the process of manipulating text on mainframes and micros is essentially different. A micro may treat your entire text as one long string of characters; the mainframe will look at only one line at a time. This allows the micro to reformat dynamically. A mainframe, on the other hand, requires strings of control characters to be imbedded in your text for functions like indentation, centering, and spacing.

Quickwriter gives you more features per dollar than any other C-64 word processor I have used. At only $19.95 for a disk or tape, it gives you basic screening editing commands, tabs, centering, page breaks, block manipulation, simple search capability, complete control of tape or disk files, headers, footers, page numbering, prompted hyphenation, and the ability to customize to any common printer.

But, like the mainframe I have to use at work, *Quickwriter* is basically line-oriented and requires strings of imbedded characters to control formatting. As you type, the cursor automatically jumps to the left margin after it reaches the right side of the screen. But it does not pull the word with it. As you type "elephant," if only "ele" will fit at the end of a line, it will remain there as you type "phant" on the next line. When the document is printed, this does not happen.

Because text onscreen is dealt with a line at a time, *Quickwriter* has no insert mode. You can move the cursor up into your text and overtype a word, but to insert a word, you will first have to insert a bunch of spaces then type the word into the blank. If you have a full line of text and insert spaces in the middle, the second half of the line will be pushed down to the next line. Deleting words will also leave you with unfilled lines. Again, printing works fine, but you will have to tell the program to reformat your text to pack each line on the screen display.

When you format text with *Quickwriter,* you must type short lines of format commands. For instance, ^bm=##, typed on a line by itself, will set the bottom margin, ^ra=1 will turn on right alignment (or justification), and ^ce=1 will center the text that follows. About three dozen similar command strings allow you to get just about any formatting you wish, but the beginning of your text may look like an esoteric series of equations until you become familiar with each command.

Quickwriter has many strengths which may more than offset its line-oriented, imbedded control string nature. On the main menu are prompts for all of the file and block manipulations. Several sample data files are included on the program disk that, along with the 35-page manual, shows you how to use all the program features.

Although you cannot create text files larger than memory, files can be linked during printing quite easily. And the top line of your screen display always tells you the maximum number of (screen) lines and the number of the line currently at the top of the display. When only a few lines are left, you will be warned. Unlike some other programs, *Quickwriter* worked flawlessly when memory was full and I continued to move blocks or attempt to type more.

Blocks are easily marked by putting a bracket (which disappears from the screen display) at the beginning of the first and last lines of the block. You cannot mark a block in the middle of a line; you will either have to delete the unwanted characters after you copy the block or force a break in the middle of the line. Blocks can be copied, moved, deleted, saved to disk, or loaded (at the end of your text) from disk.

When you are ready to format your text, you can set all margins, line spacing, and page size. You have enough leeway to work with any size paper in any printer. Tabs are set and cleared with imbedded commands but (as you might expect) you can only tab within lines, not between lines. Page numbers can be printed at the bottom of each page beginning with any number you choose (important when you link files).

Quickwriter can also prompt you to hyphenate words at the end of lines, but only during printing. You specify the maximum number of blank spaces at the end of any line. *Quickwriter* will stop on any line with too many blanks and show you the word that would have to be hyphenated in order to fill that line. It also displays the words which occur just before and after the suggested word.

You can search for any word you want, but not automatically replace it. The search only finds the first occurrence of the word. To find each successive occurrence requires four keystrokes. *Quickwriter* also has a feature that lets you imbed non-printing remarks in your text files.

Need to do form letters? No problem. Just create a text file of names and addresses, imbed a few

AHOY! PROGRAMS ON DISK
All the programs in each issue of _Ahoy!_ can be purchased on disk. See page 66 for complete details.

extra commands at the top of your form letter, and print away. Printing can be continuous or paused between pages.

Word processing on a 40-column screen is a problem for everyone. *Quickwriter* uses an approach I have never seen before; it is very effective for viewing the format of your document (but not for proofreading). Print your text, but send it to the screen rather than the printer. You can choose to see either the right or the left side of the page exactly as it will appear printed. This lets you check paragraph length, centering, indented quotes, etc.

Quickwriter's printer support is very good as long as you are familiar with the control codes for your printer. Three sample printer files are included on the disk for Epson, Gemini, and Okidata printers. There are two ways to imbed printer commands in your text file. The first uses a standard *Quickwriter* command line—^ch=18 will print reverse text on a Commodore printer. The second way is to define up to nine printer control codes (like those in the sample files) at the beginning of your file. Two keypresses will imbed any of these codes in your file.

The bottom line with *Quickwriter* is a lot of bang for your buck. You get a bunch of features even if you have to go around your elbow to use a few of them. If you are familiar with your hardware, can live without an automatic insert mode, and want an inexpensive word processor, *Quickwriter* is a good choice.

Educomp, 2319 Newcastle Avenue, Cardiff, CA 92007 (phone: 619-942-3838).

—Richard Herring

READER SERVICE INDEX

COMING IN THE DECEMBER AHOY! (ON SALE NOVEMBER 6)

CONSTRUCTION CO.
A CHALLENGING SIMULATION
FOR THE 64

PRINTERS AND PRINTER INTERFACING
FOR THE VIC AND 64

DIVING INTO BASIC
GET YOUR FEET WET

GRAPHICS PROGRAMS

Continued from page 13

menu implements an instantaneous swap of any onscreen color, including the background color. Drawing can be done from a selection of eleven brush sizes and shapes. These are also in effect when any of the geometrics are active. There is no provision for the creation of user-defined brushes or patterns.

PRIMARY FEATURES

The geometric functions support lines, circles, and rectangles. The lines function defaults to the continuous or end to end variety. Discreet lines are created by hitting the f1 key. Circles are limited to the perfectly round type. The length and width of the rectangular shapes may be independently set. All shapes are outline only. Solids require an independent fill. We experienced some difficulty in setting start points with the digital joystick. This problem did not carry over to the analog input mode.

Fill mode is fast, flexible, and limited to solid colors. Refills are possible, allowing for local color change. Freezing the fill with the f1 key permits multiple fill colors, although the results are difficult to control.

Drawing speed with the digital joystick is adjustable over a wide range from controllably fast to painstakingly slow. The analog mode responded quickly and directly to pad pressure or paddle position. Analog operation includes a "micro" mode which scales the entire range of the input device to a small section of the screen. The intent is to allow for finer drawing detail. More on this later.

Unfortunately, neither the wide speed range nor the micro mode (see below) were an adequate substitute for a true zoom mode. Although both features allow for very fine cursor control, the display is still the original size. The ability to resolve individual pixels is not enhanced.

A fixed, double-size text mode is supported. All of the upper case text characters, numbers, and punctuation marks can be placed anywhere on the screen. The user sets the start point and the program automatically increments the character position. The delete key erases unwanted characters. Text is transparently overlayed on the existing image. That is, the underlying colors are not changed.

A handy grid can be temporarily displayed as a drawing and layout aid. The grid may be incorporated as a permanent part of the drawing.

Flying Colors does not provide an "oops" feature or an alternate screen. There are no provisions to memorize or copy any part of the drawing.

ALTERNATE INPUT DEVICES

Flying Colors is the only drawing package which offers the user a choice of either digital or analog input devices. In other words, you can use a joystick or paddles. We found that the best results were obtained when used with a trackball. The standard joystick ran a close second. The use of paddles as an analog input device is best restricted to individuals with three or more hands. Or perhaps a joint effort with a friend. Anything less restricts the user to vertical or horizontal cursor movement.

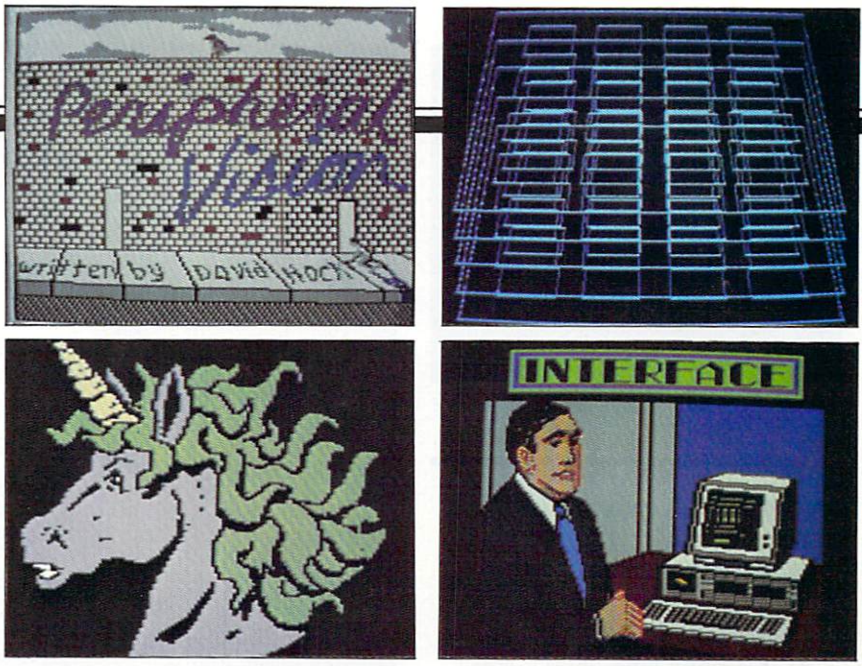
Actually, the analog input mode is intended for the use of an analog joystick or a touch-sensitive device such as a Koala Pad. The former are actually nothing more than a pair of mechanically cross-linked paddles. The joystick's output is proportional to the angular position of the shaft. This type of joystick has been used by the Apple and Radio Shack computers. Unfortunately, we have not been able to find one suitable for use with the Commodore 64.

Although the Koala Pad worked well for most operations, the program failed to properly consider the pad's stylus up default condition. When stylus pressure is reduced, either deliberately or inadvertently, the cursor jumps to the upper left corner. If the draw button is depressed, a diagonal line is drawn on the screen from the last cursor position.

The micro feature, available only in analog input mode, provides very fine cursor control over a small section of the picture area. This is done by scaling the entire paddle range into a small window on the screen. This window can be moved by "bumping" its edge in the desired direction. When used with the Koala Pad, frequent "bumps" toward the upper left corner occurred. The conclusion is obvious: stick with a joystick or trackball.

SLIDE SHOW FEATURE

The Slide Show utility included with the *Flying Colors* program is unique among the tested programs. It allows the user to automatically display images created with the *Flying Colors* program. The user simply saves the images for display on one or more diskettes. When the utility is used for the first time, it will create a "slide tray" file. The slide tray is "filled" in the desired projection order and saved to the disk as separate file. Once this is done, the tray can be used as is or refilled. If the set of images spans



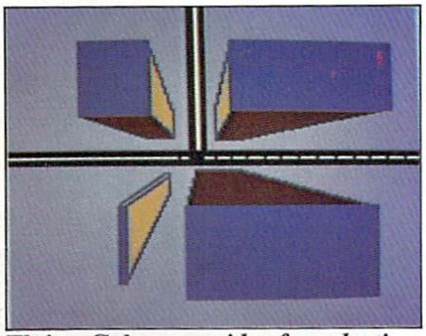
***Graphics programs covered last issue included (clockwise from top left)* Peripheral Vision, DOODLE!, Koala Painter, *and* Paint Magic.**

several disks, a user-defined prompt can be inserted at the proper time.

The "slide show" can be run automatically or manually. In automatic mode, the timing between slides can be set from 30 to 99 seconds. In manual mode, slides are displayed until the user pushes "forward" or "reverse." The program assumes that any 40-block program files on the slide disk are image files. □

Program Name: *Computer Crayons*
Type: Children's Sketch Pad
Input Device: Light Pen, Joystick, Trackball
Price: $29.95
Futurehouse
P.O. Box 3470
Chapel Hill, NC 27514
919-967-0861

Remember how you felt as a child when you got your first box of crayons and a coloring book? The little disappointments when you discovered that the crayons do not last forever and, all too soon, you ran out of paper? Consider a box of crayons which will never wear out, or be dropped on the floor to be stepped on or broken. How about a coloring book with an endless supply of pages? Or what about a set of pictures which



Flying Colors ***provides for selection of 11 brush sizes and shapes.***

can be colored over and over again? Mistakes can be instantly erased without the paper ever wearing out. Sounds good, right?

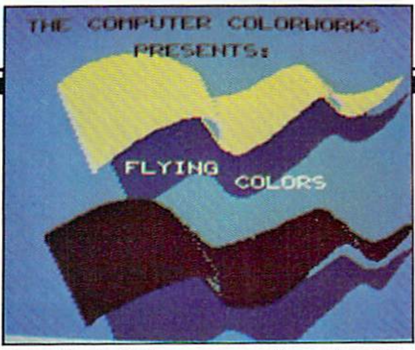
Thanks to the magic of the Commodore 64 and a little help from the people at Futurehouse, your child can have just what was described above. From the producers of *Peripheral Vision* and the Edumate light pen (see last month's issue) comes *Computer Crayons,* a child's drawing program.

The package is a long way from the sophisticated drawing programs we have been looking at. It is quite suitable for the younger child in the family (five to eight years). It does require an adult to get it going. But, after a brief training interval, your child should manage quite well on his/her own.

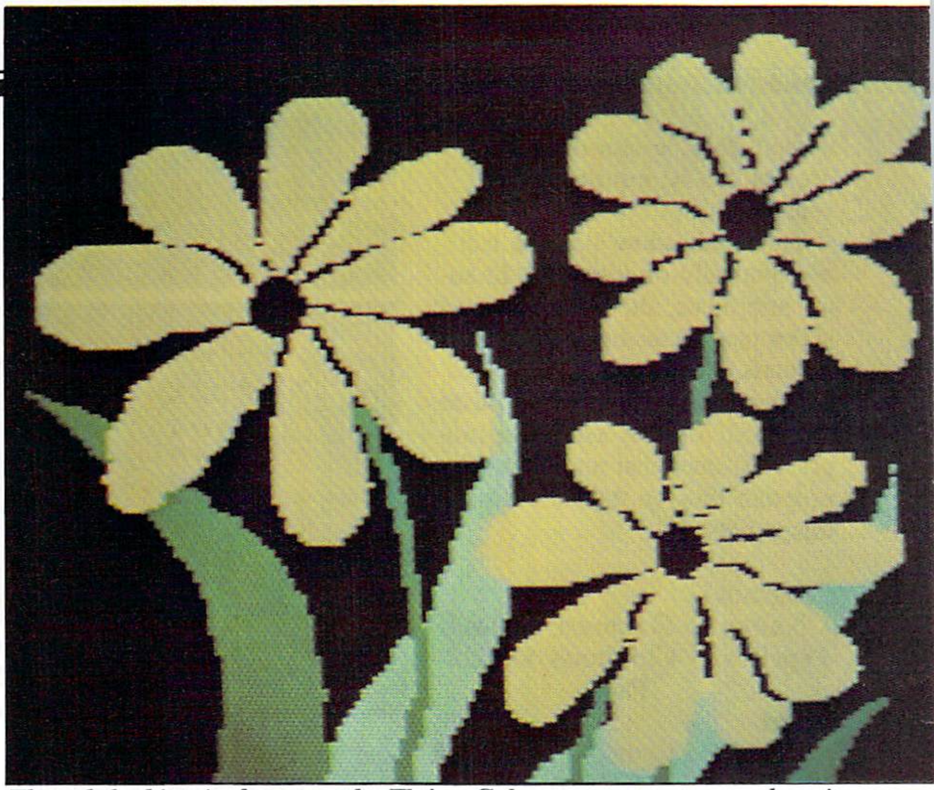
Operation is very simple. An onscreen graphic menu lets the child select the desired function by simply pointing the light pen at the proper image. The program also allows for joystick input, but we found the response much too fast to control. However, a trackball worked rather well. When used with the latter, the onscreen crayon is moved about very much like the real variety.

The program offers two basic operating modes. One lets the child select from a set of presaved drawings. There are 26 of these, one for each letter of the alphabet. Selection is made by simply pointing the light pen or moving the crayon to the ABC box on the menu. Once the desired letter appears, simply select the house symbol and the picture is loaded from the disk. The simple black outline drawings are very similar to the ones found in a coloring book. What is more, they can be colored in much the same way. Just like in a coloring book, the black outlines cannot be erased. Unlike a coloring book, the image can be restored by simply pointing to the house again. The same picture is recalled from disk, clean and neat. A nice bonus is the simple sound and animation associated with each supplied picture. This is accessed with the running person image on the menu.

The first time the program is used, it will provide a multitude of surprises for the child, 26 to be exact. There is no way of knowing what each letter represents. For the beginning reader,



Another of the many attractive title screens on the* Flying Colors *disk.



Though lacking in features, the* Flying Colors *program can produce impressive results. Especially noteworthy is the program's* Slide Show *feature.

each picture is aptly named. Unfortunately, once the mystery has been solved. there is no way to create a new set of indestructible images.

At this point, the child's creativity should take over. The hand symbol provides access to the blank sketch pad. The crayon symbol sets the drawing width from a single pixel to a broad swath in four sizes. The left arrow brings up the color menu which offers six choices plus erase. For some reason the last is in a black box. These last two options are also available in the coloring book mode.

If you have not guessed it by now, the piggy bank lets the child save the picture to disk. The face with the eyes is for "seeing" the saved pictures. There is no way to call up a directory or to display the names of the saved pictures. The child's memory is relied on for this.

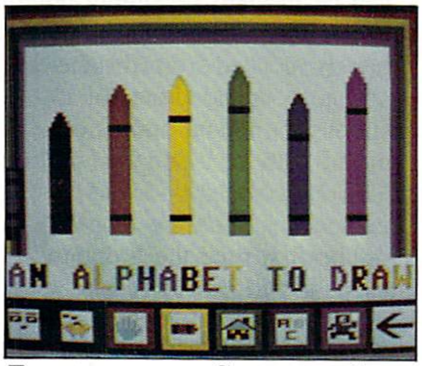
Overall, the program appealed rather well to the younger set. We know of more than one child who was well-occupied for more than one rainy Sunday afternoon. □

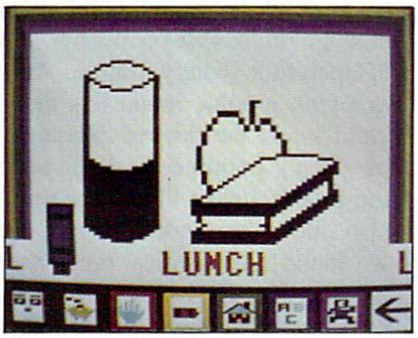
Program Name: *Sorcerer's Apprentice*
Type: Multicolor 160 by 200 pixels
Input Device: Keyboard, Joystick
Price: $49.95
Event Horizon Software
P.O. Box 1327
New York, NY 10028
212-535-0697

Sorcerer's Apprentice is one of the first, if not the first, drawing packages to be available for the Commodore 64. This early start does not indicate a lack of sophistication. It is a well-balanced package with a number of nice features.

OVERVIEW

Operation of *Sorcerer's Apprentice* is primarily from the keyboard. Cursor control may be from the keyboard or by joystick. Precise positioning is possible with the nine built-in cursor





Easy to operate,* Computer Crayons *is designed for kids five to eight.
READER SERVICE NO. 253



Features full multicolor flexibility.
READER SERVICE NO. 254

speeds and a fast/slow toggle. All other operations are accessed via the keyboard. The user manual is the uncontested winner of the prize for brevity. In addition to being short and to the point, the physical size has been reduced to near illegibility. This is a very minor inconvenience as three detailed help screens can be called up at any time with the stroke of a key. We strongly recommend their use during the learning stages.

GEOMETRICS

Preprogrammed shapes include lines, circles, triangles, and ovals. The program defines the proportion of the axes for the latter. All shapes can be drawn empty or filled. All shapes but the triangle are drawn from a settable point to the current cursor position. The triangle requires two setpoints. By simply moving the cursor, a ray effect may be generated.

Ten cursor shapes (includes the invisible cursor) allow for the creation of patterns when used in conjunction with the speed control keys (1-9). The selected number actually moves the cursor for the indicated number of pixels, leaving a cursor imprint behind. The result varies from a full overlap to a discreet footprint of the cursor. A surprising number of patterns can be generated in this way.

COLOR

Full multicolor flexibility with total user control is maintained by *Sorcerer's Apprentice*. As we described in last month's bit mapped graphics tutorial, a multicolor character cell can display three unique colors in addition to the screen background color. With *Sorcerer's Apprentice*, the user selects one of the three foreground or mixing colors as the current paint color. This color may be set to any of the 16 possible Commodore 64 colors. Switching mixing colors is the work of a single keystroke. All three mixing colors may even be the same paint color, but there is an important distinction. If the cursor is returned to a character cell, after paint color of the selected mixing color has been changed, then all occurrences of that mixing color in the character cell are changed to the current paint color.

The background color is set independently from any of the drawing colors. As a result, the user has total control of color with *Sorcerer's Apprentice*. On top of it all, the entire screen can be exclusive ORed for a multicolor negative effect.

MEMORY MOVE

Rectangular blocks may be defined and copied any number of times. Three copy modes are available: opaque, color priority of the moved area, and color priority of the stationary area. The move itself is fully visible at all times, making the result of the moves immediately apparent.

TEXT

Character sets are user definable. The sample text file, supplied with the program, can be used as a pattern for creating your own character fonts. Text files are created on the upper part of the screen as with any other image. The saved file is simply specified as a character font. Text may be placed on the screen with either transparent or opaque background.

ZOOM MODE

The magnify option enlarges each pixel to one half the size of a standard Commodore character. The magnify window may be scrolled about the screen. All options, except for text and disk modes, are available in magnify mode. □

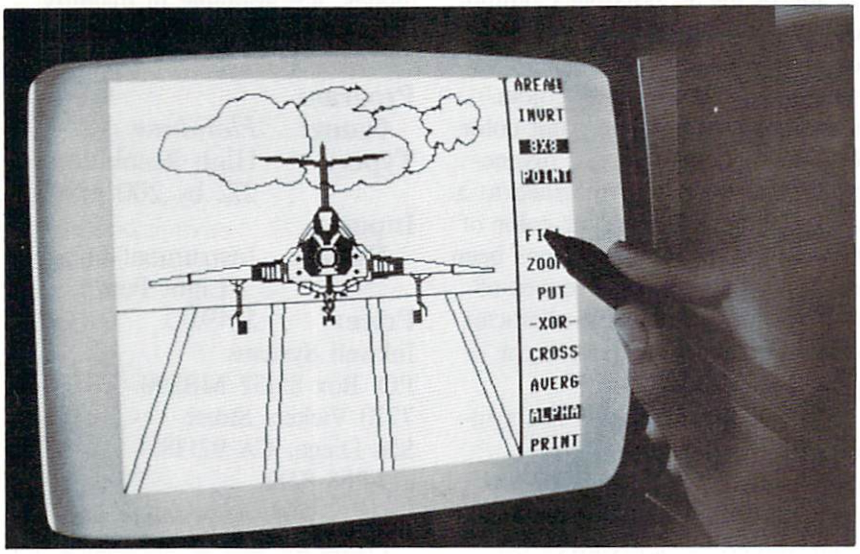
Program Name: *Flexidraw*
Type: High Resolution 272 by 200 pixels
Input Device: Instrument Grade Light Pen
Price: $149.00
Inkwell Systems
P.O. Box 85152 MB290
7770 Vickers Street
San Diego, CA 92138
619-268-8792

Flexidraw and its associated instrument-quality light pen is a well-designed high performance graphics package for the Commodore 64. The product couples high precision with several useful applications into an effective productivity tool. The *Flexidraw* system can be characterized by high precision and logical organization.

OVERVIEW

The Inkwell Systems light pen plays a key role in the overall performance of the package. About the size of a cigar, the black, anodized aluminum housing conceals an electronic circuit which is responsible for the pen's sensitivity and consistency of operation. The built-in tip switch is actuated by light pressure on the monitor screen (four ounces according to the manual). This tip switch uses an optical sensor eliminating any mechanical contacts which may wear out or corrode.

Although *Flexidraw* is a high resolution package, only 272 horizontal pixels are available for image display. The remaining 48 pixels (or six character positions) are reserved for the onscreen multilayer menu. The menu, vertically oriented on the right side of the display, is responsible for the



Flexidraw ***provides several logical enhancements for light pen operation.***
READER SERVICE NO. 255

operation of more than 90% of the *Flexidraw* features. The user simply touches the pen to the desired menu option for an instantaneous response. The menu is dynamic in that it is constantly modified to accommodate the selected feature. A total of five variations of the menu support the operating modes.

Inkwell Systems has indicated they are working on a future version which will utilize the entire display area for graphics. After working with the onscreen menu, we find it difficult to conceive of this package without it.

Color is not part of the basic *Flexidraw* program. All drawing is done in black and white. A separate utility, which we will look at later, is used to add color to the *Flexidraw* image.

The package includes a number of additional utilities. Among these are a modem transfer program for sending and receiving *Flexidraw* files, a sprite editor and animator, a music synthesizer, and a light pen piano. The *Flexidraw* machine language drawing routines may also be incorporated into the user's BASIC programs, effectively adding several graphic extensions to Commodore BASIC.

LIGHT PEN OPERATION

Flexidraw provides several logical enhancements for light pen operation. The low pressure tip switch was mentioned earlier. The CTRL key can be used as an alternate trigger device to permit offscreen operation of the pen. This allows for a more relaxed and natural brush type motion for certain operations. The built-in pen electronics eliminates keyboard conflicts. Thus all characters are available from keyboard for disk file names and text entry.

The light pen offset can be readjusted in single pixel increments during program operation. If necessary, the initial calibration sequence may be called up at any time without any loss of data.

The entire screen may be inverted, that is, light and dark interchanged. This allows the light pen to draw on dark areas.

GEOMETRICS

The standard geometric functions include round circles, lines, rays, and rectangles. An invisible grid option confines the drawn image to either discrete points on or line segments between the grid intersections. A dynamic, full-screen cross hair permits precise positioning of pixel points in relation to other parts of the picture.

ALTERNATE SCREENS AND TEMPLATES

Two completely independent images are maintained by the program. A very powerful grab function makes maximum use of the alternate screens. Included with the *Flexidraw* package are several "symbol templates" as well as detailed instructions for creating your own. The "get" and "put" functions allow precise positioning of symbols from the template on the working drawing. Applications range from engineering and architectural drawings to music and custom alphabets. The package includes templates for math, music, architecture, and electronics.

The *Flexidraw* image transfer process allows for three options. Once an image is stored in the "get" buffer it may be "put" on either of the two screens any number of times. The image actually remains until the user gets a replacement. The "put" function can be either absolute, logically ORed, or exclusive ORed (XOR). The first is a totally opaque transfer. The second is totally transparent. The third only leaves the pixels which are not common to either the underlaying or overlaying images. The last function allows for an easy erase of a part of the image. Simply execute a GET followed by two XOR puts without moving the image.

Flexidraw includes a set of 14 built-in fill patterns. In addition, the fill may be implemented with any of the keyboard characters.

User patterns cannot be designed from within the program. The manual includes instructions on how to create and store user patterns before initializing the program.

TEXT

The full Commodore character set can be entered on the image via the keyboard. The character cursor is automatically positioned to the standard screen character positions. The basic keyboard editing functions are supported.

PRINTER AND DISK OPERATION

Flexidraw provides a bit image screen dump for several popular printers, in particular the 1525/MPS-801, Gemini, Epson, C. Itoh, and Okidata. Single and double size print options are available on all but the Commodore and Okidata printers.

Disk operations support directory display, disk format, and file deletion, as well as load and save.

COLOR

The *Flexidraw* color facility is an independent program on the user disk. A presaved *Flexidraw* image is called up by the Pen Palette utility for subsequent painting. Colors are selected from up to 23 user-defined paint pots. Each pot in the onscreen menu holds a foreground/background color pair. Thus the color of a single image is limited to only 23 of the 256 possible combinations.

In exchange for this relatively minor limitation, the paint pot system provides some very powerful features. Each paint pot is linked to the particular character cells which were painted from it. Changing the paint pot colors instantaneously changes the corresponding image colors. In support of this feature, one of the color menu functions is used to detect which paint pot was used to color a screen location.

The Pen Palette machine language subroutine, which controls the paint pot selection, is available to the user. Using this routine allows for easy color animation of *Flexidraw* images from within a BASIC program.

OTHER FEATURES

Several light pen utilities and demonstration programs are provided with the user disk. These include a light pen-driven music synthesizer, piano, sprite editor, and sprite animator. The *Flexidraw* machine language drawing routines are available to the user. Complete instructions show how to link these routines to a BASIC program. In effect, the *Flexidraw* routines comprise a graphic extension to Commodore 64 BASIC.

Overall, *Flexidraw* offers a great deal of power and performance for the price. Users interested in a high-performance light pen graphic system would do well to consider this package. □

Program Name: *Super Sketch*
Type: Multicolor 160 by 200 pixels
Input Device: Custom Mechanical Tablet
Price: $59.95
Personal Peripherals Inc.
Merrick Park
930 North Beltline Road
Suite 120
Irving, TX 75061

Super Sketch is the only package with the driving software in a plug-in ROM cartridge. We took a close look at the *Graphics Master* program and were surprised at the number of features squeezed into the eight kilobyte ROM.



Super Sketch ***custom input device.***
READER SERVICE NO. 256

THE HARDWARE

Super Sketch comes with its own custom input device. The hardware bears a strong resemblance to a plastic clipboard approximately 10 by 14 inches. At the top edge are a set of five large buttons which generate command inputs to the program. The drawing surface has an active area of approximately seven by six inches. The actual input device is a movable plastic arm whose tip may be positioned anywhere on the drawing surface. A pencil or stylus may be inserted in the end of the arm. A predrawn sketch or blank paper can be clamped over the drawing surface.

The actual input signal is generated by a pair of mechanically linked, linearly actuated variable resistors otherwise known as slide potentiometers. Interestingly enough, the hardware does not use the built-in paddle input circuits of the Commodore 64. The tablet provides its own three-channel analog-to-digital converter. This circuit is housed in a small rectangular box which plugs into the Commodore 64 joystick port. Two of the channels transmit the arm positioning data as a serial bit stream. The third channel is used to decode the command pushbuttons. Now that's what we consider a high tech product in a low cost package!

The hardware worked surprisingly well, although the arm assembly tended to drag a bit more

than we would have liked. A pair of clamps are provided to hold down a piece of paper or predrawn sketch. A full set of practice sketches are provided for just this purpose. We found that the stylus had a tendency to grab the paper at inopportune moments. Some masking tape along the bottom edge minimized this effect. Best results were obtained with freehand operation on a clean tablet.

The top panel sports four buttons and a large center bar. The latter serves only to operate the paper clamps. The four buttons actuate the main control functions of the drawing software. The lift function, which is used the most frequently, is duplicated on the left and right sides. It does juts what is sounds like: lift the software stylus from the screen surface. The menu button calls up the onscreen main menu, as well as serving as an escape key when all else fails. The select button initiates the user's choice off the menu.

We would have liked to see the last two buttons duplicated as well. The existing arrangement tended to generate some awkward hand swaps at times.

THE SOFTWARE

A menu on the left side of the screen indicates the main operating modes. These are selected by positioning the cursor next to the desired function and hitting the select button. Operation does not start till the lift button is pressed. The menu display is removed once the selected function is active. A small zoom window is normally displayed in either the lower or upper left screen corners. This continuously shows the pixel detail in the immediate vicinity of the cursor. The automatic jump of the window to the opposite corner whenever the cursor is moved into the vicinity took a little getting used to. The user can turn off the zoom window if desired.

The onscreen zoom window was adequate for its purpose, although not as effective as a true zoom. The resolution of the input mechanism was just sufficient to allow for individual pixel positioning. However, a true zoom, with the input scaled up, would have been preferred.

A second "expert" menu can be called from the main menu. All of the geometrics, copy, mirror, text, and disk functions are accessed here. The two menus coupled with the need to press the select and lift buttons made for a considerable amount of button-pushing at times. It would have been nice to have an option of direct keyboard call of the different operating modes.

All of the major drawing functions are available in one form or another. The program offers a choice of eight brush patterns and eight fill patterns. The user can design his own multicolor patterns for each purpose as well. Unfortunately, there is no provision to save any of the custom designs. Only one design can be active at a time. It was also easy to lose the pattern when initiating a mode change, such as a color change.

GEOMETRICS

All of the basic geometrics are supported. These include lines, rays, circles, ellipses, and rectangular shapes. Only outlines of the solid shapes can be generated. A separate fill operation is required to produce a solid or patterned shape. In addition, the program will automatically generate horizontal or vertical lines at any point off the screen. The built-in mirror options offer maximum flexibility. The user may choose from four corner (quad), horizontal, and vertical mirroring. The zoom window should be turned off when using any of the mirror functions.

DUAL SCREENS

Super Sketch maintains two independent screen images in the computer's memory. An effective copy feature allows any part of an image to be memorized and transferred to any other part of either image. Multiple copies of a memorized image are supported. Copies are transparent, that is, background color areas of the transferred image do not erase the underlying image.

OTHER FEATURES

Super Sketch allows the user to define a window to limit drawing activity to a specific portion of the screen. For example, any of the mirror modes can be contained within a preset boundary. The text mode displays the upper case alphabet, numbers, and punctuation. Characters are approximately 50% larger than the standard display. The text start point may be positioned anywhere on the drawing surface. Once started, the cursor is automatically spaced for the next character. Text placement is transparent, that is, the background colors are not affected.

Both tape and disk operations are supported for saving and storing picture files. The disk mode allows scratching of files as well as disk formatting. Disk files are in Koala format. The disk directory is automatically scanned for compatible files. These are displayed on the screen for user selection. □

For a look at some of the excitement scheduled for the December issue of *Ahoy!*, see page 91.

Put the World on Hold!



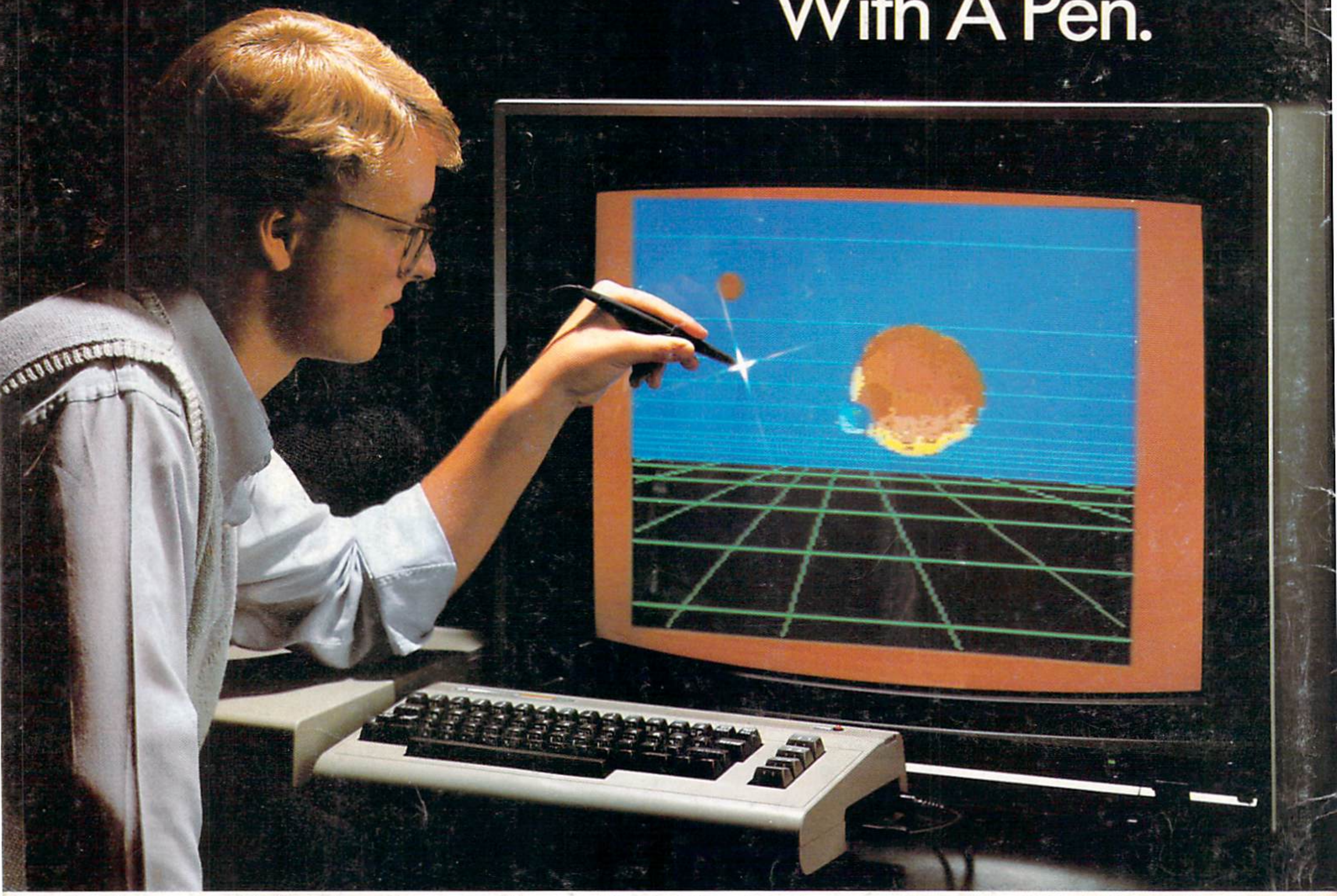
Cast off your cares and come sailing in the exotic Caribbean.

Not a dress-for-dinner floating hotel...but "barefoot" sailing & beachcombing for those with adventure in their souls. Lend a hand...or feet on the rail. Six exciting days from $425. Write for your free Great Adventure Book.



Release The Graphics Power Of Your Commodore 64™...

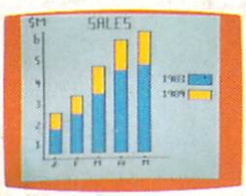
With A Pen.



Now there's a sophisticated graphics system for your C-64—the Koala Light Pen System™ from Koala Technologies. It's easy. You work directly on your computer screen to draw, design, chart graphs. The Koala Light Pen System is all you need.

A State-Of-The-Art Light Pen

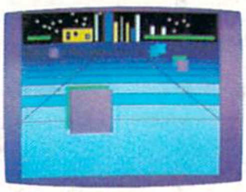
We've packed all the electronics in the streamlined Koala Pen, using the most advanced miniaturization techniques.



This means clearer, smoother, more precise graphics—and, unlike other C-64 graphics products, you can use the full range of the C-64's colors. It also has an easy-to-use tip-switch.

A Complete Graphics Package

Koala, well known for our graphics systems, has created the premier



C-64 graphics package. It contains a complete array of graphics capabilities. In addition, you can dip into a palette of 16 colors—and over 3,000 textured patterns. Point to "mirror" and a kaleidoscope of colorful images bursts onto the screen. Zoom in for 320 x 200 resolution. "Rubber band" lines and shapes.

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The Koala Light Pen System™ and Graphics 64 Software.™



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800-KOA-BEAR

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